

# MARINE REVIEW.

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## Heavy Ship but Big Carrier.

In accordance with a policy that seems to prevail in all places where the interests of John D. Rockefeller are represented, it is seldom that anything pertaining to the affairs of the Bessemer Steamship Co. (with official sanction to it) is found in print. Interviews with Mr. L. M. Bowers, general manager of the Bessemer company, have been very rare, but when it was announced from Duluth, a few days ago, that the steel barge John Fritz, recently built at West Bay City, had taken on a cargo of 7,795 net tons of iron ore, he did not hesitate about giving expression to the great satisfaction which the dispatch contained for him. This immense cargo was carried on a mean draught of 17 feet 1 inch. It has been claimed in all parts of the lakes that the three vessels of the Bessemer company that have been under construction at West Bay City were entirely too heavy for requirements in the lake trade; that they were so loaded down with material, in order to gain great strength, that there would be a marked loss in their capacity as compared with other vessels of about the same dimensions. It is a fact that these three vessels contain full 8,000 tons of material; that is, hull material, irrespective of machinery, boilers or equipment of any kind. This is said to be about 25 per cent. more material than has been used in some vessels that are well up to the dimensions of the new West Bay City ships. The policy of making these vessels so strong involves, of course, a great many considerations, not least of which is safety in operation and the probability of the larger steamship lines meeting with conditions later on that may prompt them to undertake their own insurance. Mr. Bowers referred to these points while reviewing some figures on what the big barge would carry on deeper water and in other lines of the lake trade.

"I have just called up Mr. R. L. Newman, of the Globe company," he said. "Mr. Newman is entitled to full credit for the plans of that vessel, as well as the two others building at West Bay City. Before the vessels were ordered he was consulted, with several other builders on the lakes, and the ideas adopted regarding the different questions entering into the system of construction to be followed were practically all submitted by him. He worked out the scheme of distribution of material that has made this vessel so satisfactory. The highest estimate we had of capacity from any of the builders on the dimensions and weights proposed was 6,500 gross tons on 16 feet 10 inches draught. The vessel has carried 6,960 gross tons on 17 feet 1 inch."

The actual weight (including 1 per cent. for moisture) of the cargo carried by the Fritz was 6,960 gross, or 7,795 net, tons. It is by long odds the largest load of any kind ever moved on the lakes. It is equal to 260,000 bushels of wheat. If loaded into cars of twelve tons each there would be 650 cars, or sixteen trains of forty cars each. If the Fritz had loaded to 17 feet 5 inches, a depth to which some vessels are now loading from Lake Superior, her cargo might have been increased to about 7,200 gross, or 8,064 net, tons. If loading grain out of Chicago on 18 feet draught this vessel would carry 285,000 bushels of wheat, or 530,000 bushels of oats, provided, of course, that space could be found for the latter.

## Differences With Underwriters.

Owners of the steamer Ed. Smith No. 2, sunk in Lake St. Clair, Sunday, had hardly abandoned the vessel to the underwriters (McCurdy-Prime syndicate of Chicago) when it was announced in the newspapers that the abandonment would not hold. A newspaper decision on such a point is, of course, not of much consequence to either owners or underwriters interested in this vessel, especially as the announcement is made in advance of any definite information as to the condition of the steamer, cost of raising and repairing her, etc. But this dispatch, prompted probably by the opinion that there will be difficulty in settling losses on all ships of the older class in future, has again caused considerable discussion regarding the policy of underwriters this year toward wooden vessels. The impression has gone out, since the refusal of the Chicago syndicate to accept the steamer Outhwaite or her consort Barr as a total loss, that the Chicago interests, having the bulk of insurance this year, will undertake a more exacting policy than in the past regarding wooden vessels, and quite a feeling of resentment has been stirred up among the owners of this class of tonnage. Officers of the syndicate are undoubtedly aware of this feeling, but thus far they have seen fit to refrain from any public reference to the matter.

Owners of the Outhwaite and Barr have begun suit in Cleveland to recover the full insurance on both vessels, \$120,000, and the action will undoubtedly be very earnestly contested. The Barr, which was repaired by the underwriters, lies idle at Detroit, the owners refusing to accept her, and the same will undoubtedly be the case with the Outhwaite when her repairs are completed at West Bay City. Several experts on both sides have watched repairs on the vessels, and the action in the courts when it comes up will be of a very spirited kind.

Several interests are involved in the sinking of the Smith. It will probably be another suction case, if it goes into court, with the Minnesota line steamer Mesabi made a party to the action. The Smith and the steamer Aurora are insured with the Chicago syndicate, while the Auranian's insurance, placed through C. A. Macdonald & Co. of Chicago last year, is probably held by companies represented by Mr. Macdonald and Johnson & Higgins. The latter firm also has the insurance on the Mesabi.

Chief Mordecai Endicott of the bureau of yards and docks of the navy department, in writing to the Review with reference to the two floating dry docks for which bids are soon to be solicited, states that no designs have been prepared, as it is the desire of the government to purchase docks already built. These are docks that will be sent to Cuba.

## Case Against Ore Roads—Pioneer Mine.

Duluth, Minn., July 26.—Testimony is still being submitted to the state railway and warehouse commissioners here in the action brought by the owners of the Pioneer mine to enforce a reduction in freight charges on the Duluth & Iron Range and Duluth, Mesabi & Northern roads. The commissioners have made a trip over the road accompanied by the lawyers and other interested parties. Testimony during the past few days pertained mainly to cost of building the railways and was not of general interest. It is still the general opinion here that the case of the complainants is not nearly as strong as what was expected from the so-called independent mine interests.

In the course of this hearing some facts have been brought out regarding the ownership and operation of the Pioneer mine. The property was bought by Dr. Conan and others in 1883 for something less than \$23,000, and in 1886 was leased to the Pioneer Iron Co. for twenty years at 50 cents a ton royalty, with a minimum output of 20,000 tons. The mine has been operated with more or less energy since then, and last year produced 207,000 tons, its total for the entire term of the lease being 417,000 tons. The royalty has been kept up, but now the mine is closed and the lessees are endeavoring to secure a reduction to 30 cents. Concessions already made reduce the royalty to 40 cents on the first 75,000 tons, and 35 cents on all above that in the year. The stock of the lessee company is held as follows: Oglebay, Norton & Co., Cleveland, 13,000 shares; Thos. Bardon of Ashland, who is president and general manager, 5,500 shares; J. B. Spooner of Wisconsin, W. H. Phipps, and J. A. Humbird of Hudson, Wis., 16,300 shares; W. J. Conan of Superior, 4,000 shares, and J. G. Brown, 1,200 shares; total capitalization, 40,000 shares of \$25 each. The stockholders of the lessee company have already put \$250,000 into the mine above their receipts from sales of ore. The ownership of the fee to the property is held by W. J. Conan and wife, and one-sixth each by Martin and Wm. Pattison of Superior, and R. Whitesides of Duluth. The ore deposit is very large, being estimated all the way from 10,000,000 tons to twice that figure, and is a deep continuation of the Chandler's famous deposit. The two mines join and there have been many rumors as to purchases of the Pioneer's lease by the Chandler's owners. In the natural course of events, the Chandler people would be the proper persons to buy the Pioneer, as they are equipped with machinery, pumps, shafts, etc. The Oliver Mining Co. is also watching this mine with interest and has certain deals pending that may result in purchase. It has offered for an extension of the present lease for twenty years additional a bonus of not far from \$400,000, and is willing to agree to a minimum royalty of 30 cents on 500,000 tons annual output.

## Machinery of the Belle Cross.

Duluth, Minn., July 27.—In 1897 the steamer Belle P. Cross, which has had an eventful career since reaching the head of the lakes from Cleveland, was libeled for supply bills and repairs. Sometime previous to her arrest, her machinery had been removed and incorporated into the tug Tomlinson. Writs were issued against the Cross and the machinery of the tug. The Cross was allowed to go to sale. The owners of the tug bonded her machinery at its appraised value. Subsequently an intervening libel was filed by the Inter-Ocean Coal & Coke Co., and another writ issued against the Tomlinson's machinery, which was again bonded. The case came on for hearing, and District Judge Lochren of Minnesota held that the machinery of the Tomlinson was liable for the debts of the Cross, and that the stipulators must pay each of the bonds given for the release of the machinery. The questions involved were the right to proceed in rem against the machinery, necessitating the detention of the tug, against which no claim was made, and whether the owners of the Tomlinson and the stipulators on their bonds could be held for more than the value of the machinery, or should the case be treated as one under general admiralty, rule 8, which would simply require the owners of the Tomlinson to deliver up the machinery or pay its value as part of the fund arising from the sale of the Cross. No opinion has been filed, and the case will doubtless be appealed.

## All Under One Management.

In accordance with negotiations that have been under way for some time past, a reorganization of the Ship Owners' Dry Dock Co. of Cleveland has finally been effected, and the three dry docks of Cleveland are now under one management. The Cleveland Dry Dock Co. winds up its affairs, but Capt. W. W. Brown, who has been very successful in the management of that concern of late, and who was quite active in bringing about the consolidation, has been given the management of the combined plants. He will undoubtedly apply additional energy to the enlarged enterprise, and will find opportunity in the control of three docks, to hold a full share of docking and repair work in Cleveland. No improvements in any of the docks are contemplated just now, but the entire plant will undoubtedly be kept up to the requirements of a very large amount of repair work that is continually going on in Cleveland. There will, of course, be no change in charges for docking vessels, as the schedule of rates is uniform throughout the lakes. Directors of the new company are H. M. Hanna, L. C. Hanna, Luther Allen, R. L. Newman, Capt. John Mitchell, H. A. Hawgood and R. L. Ireland. H. A. Hawgood was elected president, Capt. John Mitchell vice-president, R. L. Ireland treasurer, and Capt. W. W. Brown secretary and manager.

J. C. Gilchrist has traded another house and lot for a vessel. He takes the schooner Charles Foster from Valentine Fries of Milan, O., in exchange for a place on Amesbury avenue in the East End, Cleveland.



### Railroad Managers Interested in Chicago River.

The circumstances connected with one of the series of meetings now in progress in Chicago looking to the devising of plans for the improvement of the Chicago river were of a character to afford a wholesome example to railroad officials in certain other lake cities that might be mentioned. At the meeting in question General Manager W. C. Brown of the Chicago, Burlington & Quincy railroad made an address, in opening which he stated that the elevators burned last May would not be rebuilt on the Chicago river unless there was some assurance that vessels of the largest type would be enabled to reach them. Then, taking up a new phase of the question, Mr. Brown, in evidence of the sincerity of the desire of his road for the improvement of the river, made the proposition that where the Burlington owned land on both sides of the channel it would donate all the property required, while where its ownership extended on only one side of the river the donation would be equal to that of the property owner on the opposite side of the channel. The railroad company, he also stated, would widen the river in the vicinity of the site selected for its new elevator. The drainage trustees also stated that they would go to the limit of their funds for the improvement of the river.

The point, however, most likely to impress men working for the development of the shipping interests in lake cities other than Chicago, is the unusual, but not the less gratifying, spirit of co-operation manifested by the railroads, and the case of the Burlington is not an exception, but is merely cited as an instance of a spirit that has been all but universal among the lines affected in Chicago. It is certainly within the memory of marine men at the other principal ports that railroads have shown a disposition to take a view of the situation exactly opposite to that of the Chicago gentlemen. Therefore, the present manifestation of a realization on the part of railway officials that the interests of the rail and water transportation lines are not always divergent is especially welcome, by reason of the hope that it will in time become of more general acceptance.

Among those present at the Chicago meeting were: W. C. Brown and F. A. Delano, general manager and chief engineer of the Chicago, Burlington & Quincy railroad; Murray Nelson, for the elevator interests; Capt. J. S. Dunham, John Spry, James Galloway and Geo. Merriweather for the Chicago River Improvement Association; Geo. Bryne, for Armour & Co.; S. R. Ainsley and F. E. Pardis, general manager and chief engineer of the Chicago Terminal Transfer Railway; Engineer Williamson, representing the gas interests; B. A. Eckhart, Z. R. Carter, J. P. Mallette and Frank Wenter of the Drainage Board. The object of the meeting was to unite, if possible, on some plan for widening the river at the point mentioned instead of building bypasses, and the speakers all seemed to favor the idea and to make mutual concessions to secure this point.

Trustee Wenter said that the board was willing to allow the sum at its command for improvement of the river, to be devoted to dredging or to bascule bridges, as seemed most advisable, but that they could not do both, as they had already obtained with great difficulty an increase of appropriation for the canal and would certainly be refused any further increase by the legislature. Mr. Delano called the attention of the river men to the great need of a place in the river where vessels 450 feet long and 50 feet beam could wind around. He said that his road had five other elevators in the river, besides the one that had recently been burned at that point, and that unless such a winding place could be provided at that point his company had decided not to increase its investment in this direction; if such a place were provided for, the company would rebuild its burned elevator there, putting up a 1,500,000-bushel house, and would donate sufficient land for one-half the necessary excavation, provided the owners of the property on the opposite bank would donate the other half. He dwelt at length on the necessity of providing for large tonnage vessels, and declared that if the river interests would remove all other objections to the river for large vessels, the city tunnels would not be long allowed to remain, after they formed the only impediment to navigation. The property on the other side of the river is occupied by the gas company and a lumber company. Mr. Brown stated that unless this were done it meant the loss of a large amount of the grain now handled in Chicago. The grain would go to St. Louis and other southern points, which were already competing with Chicago for the grain trade.

All of those present favored the abolition of center pier bridges, but in the absence of representatives of the city, definite action could not be taken this meeting, and General Manager Ainsley could not promise anything on the part of his road toward defraying the cost of a bascule bridge to replace the center pier bridge now used by his road. He believes that the drainage board would save money by erecting the bascule at its own expense.

Another meeting will be held shortly at which the various interests will endeavor to confer with the representatives of the city and come to a conclusion, if possible, that will fairly conserve the interests of all parties. There is much good sense in the remark made by Mr. Delano, to the effect that the way to dispose of the tunnel question is to ignore it until such a time as it can be shown that it alone is interfering with the free use of the river. At present the tunnel men find it only too easy to begot the question by bringing into the discussion all the other disadvantages river navigation is laboring under and thus make the advocates of a deep river lose sight of the tunnels entirely. With the other things out of the way, this will no longer be possible, and the street railways will soon be brought to time by a united pressure too great for them to withstand.

At the port of Lunenburg, N. S., 45 miles west of Halifax, and the most important fishing center in Canada, there has lately had completed an up-to-date marine railway. It is constructed specially for handling the bank fishing fleet and vessels engaged in the West India trade, although it can accommodate vessels of 400 tons capacity. There are two cradles, 120 feet and 75 feet in length, on one track. These cradles can be operated separately or together. The foundation is of piling driven to bedrock, and all the timber used in the construction of the track is pitch pine and hardwood, sheathed from low water mark outward with zinc and iron over felt. The hauling is done by a pair of horizontal coupled reversible engines. It is owned by the Lunenburg Marine Railway Co., and cost \$20,000.

### Problem of a Canal for Large Traffic.

Several months ago there was presented in the American Society of Civil Engineers by Mr. Joseph Mayer, a member, a paper on "The Economic Depths for Canals of Large Traffic." The treatise, of course, revolved around the desire on the part of some lake cities to become seaports, and the widespread belief in the possibility of the accomplishment of the project as indicated by recent congressional appropriations for surveys to determine the most feasible route for a ship-canal from the lakes to the ocean. The interest which this paper has aroused is strikingly manifested by the correspondence embodying a discussion which has been received by the secretary, Charles Warren Hunt.

Edward P. North, vice-president of the society, in his discussion of the paper, said: "A ship canal would apparently have a considerable naval value just at present, and at all times by making the skill and capital now employed in ship building on the lakes available for that purpose it would facilitate any effort to control our own appliances for conducting our foreign commerce. As there is no place at present where ships can be built at so small a cost, either in money or labor, as on the lakes, it is not improbable that the value of shipping constructed there would amount to \$50,000,000 in some years if convenient access to the sea could be had."

Maj. T. W. Symons, United States engineer at Buffalo, in writing on the subject of this paper, proved himself as ever a staunch advocate of an enlarged Erie canal. He wrote: "Probably the great bulk of foreign shipments from New York will in the future be almost entirely confined to berth shipments in the enormous freight-carriers like the Pennsylvania, Kaiser Wilhelm II and ships of like character, capable of carrying from 20,000 to 30,000 tons and drawing 30 feet of water and over, and that the business of the lakes will be done in great lake steamers drawing 18 to 20 feet and carrying from 6,000 to 10,000 tons, and that the problem is really limited to determining the best method of connecting these two characters of ships, that is, transferring the cargo of the big lake ship lying in a lower lake port to ocean ships lying in New York harbor, and vice versa. The best and most economical method for accomplishing this connection would be by cheap barges suited to navigate a barge-canal built along the general line of the Erie canal."

Mr. George Y. Wisner of Detroit, a member of the United States board of engineers on deep waterways, wrote: "No satisfactory discussion of this question can be made until there is known, approximately, the cost of transportation from Chicago and Duluth to the seaboard, in different types of vessels, through channels of which the cost is known for the depth required. Until these data are known, the advocates of any particular route or type of canal can make assumptions, which cannot be disproved, on which strong arguments may be based in favor of its adoption."

### New Devices for Submarine Work.

The Smith diving bell, which has been used in the recovery of the copper cargo of the steamer Pewabic, and which was illustrated and described for the first time in the Review of last week, is compared by a writer in *Pearsons' Magazine* to two recent foreign inventions for similar purposes. One of these inventions, very similar in design to the Smith apparatus, is the "submarine worker" of late invention by M. Peatee del Pazzo. It consists of a huge sphere of cast iron, covered with oilcloth 3 inches thick, so that it is claimed to be able to adequately resist a pressure so great as to enable its descent to a depth of 550 yards. In the front of the sphere is a powerful lens illuminated by a large electric light, suspended like the bell from the ship. The movement of the machine is accomplished by three screws regulated by the rudder. As in the case of the Smith device, the bell designed by the French inventor is furnished with shovels, pincers and steel hooks, attached to the outside and operated by the men inside the bell. The telephone and signal apparatus is similar in arrangement to that in the Smith invention. The other invention, which embodies the idea of a Swedish engineer, is nothing other than a submarine telescope or diving chimney of gigantic proportions. Each section is 20 feet long and the largest has a diameter of 15 feet. The telescope is made of the strongest aluminum bronze and of a thickness sufficient to withstand a pressure of 400 pounds to the square inch. The chimney is designed especially to enable the raising of wrecks, and the lowest section of the telescope is equipped with rubber arms whereby the workmen are enabled to fix grappling hooks and chains to a sunken vessel.

### American Steel in the Norwegian Market.

American ship steel has already invaded the Norwegian market and is in the near future likely to do so to an even greater extent according to a letter written to the Review by Mr. Carl L. Holmer, a naval architect who was, up to a short time ago, in the service of the Cleveland Ship Building Co., but who is now with the Bergens mekaniske vaerksted at Bergen, Norway, one of the leading ship yards of the Scandinavian peninsula. In the course of his letter Mr. Holmer says: "We are now able to purchase American ship steel, delivered in Bergen, for \$1.50 less per ton than we can secure it from England, so that we may be using Carnegie material when the present contracts are filled." Mr. Holmer speaks highly of the Norwegian fisheries exhibition now in progress, remarking that it is a very complete one and that there are many exhibits of exceptional interest to ship builders and engineers in general.

In this connection it is interesting to note the comments of Lieut. Gellmuyden of the Royal Swedish and Norwegian navy, who was sent to Santiago by his government to study American methods of warfare. Says he: "We are increasing our Norwegian navy. We have already ordered two small battleships, and two more vessels are to be built. The Armstrong Co. of Great Britain secured the two contracts already let, but the other two vessels will, I think, be built in the United States, if terms can be made."

Governor Black of New York has announced the appointment of Messrs. Charles A. Schieren, Andrew H. Green, Hugh Kelly, C. C. Shayne and Alexander R. Smith as a commission to investigate New York's commerce, the cause of its decline and the means of its revival.



### Commendation for American Liners.

Mr. Frank E. Kirby of the Detroit Dry Dock Co., who has for some weeks past been in the service of the government on the inspection of vessels available for use as transports and supply ships, is very enthusiastic over the showing made thus far by the steamers of the American line. In speaking of the matter he says: "One thing that especially impresses me in this war is the valuable aid given by the auxiliary cruisers St. Paul, St. Louis, Yale and Harvard, all formerly of the American line. The Yale has been especially useful in transporting troops, and the other three as scouts and troop transports. The establishment of the American line marked a new era in the progress of this country. At the time there was violent opposition from certain quarters to the purchase from the English of the New York and Paris, now the Harvard and Yale, but it was overcome, and the ceremony of hoisting our flag over them at New York was witnessed by enthusiastic thousands. Then the building of the St. Paul and St. Louis followed. It is reasonably certain that this country could not have purchased four such ships from a foreign nation when war was imminent and after it began. Their presence now gives much added strength to the navy, just as their absence would seriously cripple it."

### Middle Neebish Channel Improvements.

A clear demonstration is afforded by the accompanying sketch of the necessity of the rules of the navigation of Middle Neebish channel, St. Mary's river, prepared by the war department, and which, in connection with an explanatory letter from Col. G. J. Lydecker, United States engineer at Detroit, were presented in the last issue of the Review. The channel in question is at best barely 300 feet in width, and the dredging operations have now reached a point whereby the navigable width is reduced to 150 feet, and inasmuch as the channel has steep, rocky sides and a very swift current, the difficulties are readily appreciable. The gravity

### Energetic Work by Commodore Melville.

Commodore George W. Melville, chief engineer of the United States navy, has had the staff of his office busily engaged this week in sending out specifications for the new battleships, coast defence monitors, torpedo boats, and torpedo boat destroyers provided for by the recent naval appropriation bill, and which have previously been described at greater or less length in the Review. Chief Melville deserves especial credit for the system which he is observing so strictly of insisting that all engineering work necessitated by the exigencies of the war be made of permanent value. Work has just been completed by the engineering branch on the three old single-turreted monitors, Manhattan, Canonicus and Mahopac, lying at League island navy yard. In order to save time this work was done in a curious fashion. New boilers were required for all three vessels, but ordinarily the placing of them would have necessitated the tearing up of the iron decks and some elaborate reconstruction. To obviate this the boilers and machinery were made up in small sections and passed through the smoke stack openings, and now the completion of the work finds the decks in as good condition as before. As a war expedient, Commodore Melville has adopted the plan of having duplicates made for all important parts of steam machinery, so that breaks on war vessels may be repaired in short order. A large assortment of these extra parts has been placed on board the repair ship Vulcan.

### Defects in Dry Dock Construction.

Some rather startling testimony was brought out last week at the court-martial for the trial of Civil Engineer U. S. G. White, the charges growing out of the faulty work on dry dock No. 3, the big wooden dock at the Brooklyn navy yard. Lieut. White was at the time of construction directly under the instructions of Civil Engineer Menocal, who was recently tried for inefficiency in the performance of his duty in connection with this dock, and suspended for three years. The testimony submitted





## GREAT LAKES RESERVOIR SYSTEM.

THE SUBJECT OF A LIVELY DISCUSSION AT THE DETROIT CONVENTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

By far the most interesting discussion—from the standpoint of shipping interests—which occurred at the Detroit convention of the American Society of Civil Engineers, this week, was that engendered by Capt. Hiram M. Chittenden's paper on "Reservoir System of the Great Lakes and the St. Lawrence Basin." Capt. Chittenden's views and the foundation of his line of argument are shown in part in the following extract:

"Notwithstanding the vast magnitude of these lakes and their resemblance in many particulars to tidal waters, they are, after all, only parts of an immense river system which drains a large area of country. They are subject to the variable conditions of water supply characteristic of all streams. The connecting channels and the final outlet carry a continuous current, always in one direction, unlike maritime straits and canals through which the water may flow in either direction depending upon the state of the tide or of the wind. But while the lakes and their connecting channels thus constitute a great river system, that system differs from nearly all others in this particular—that the flow in the outlets is practically exempt from those variations and irregularities which obtain upon nearly all other streams. The explanation of this most important characteristic is to be found, of course, in the controlling action of these lakes as great reservoirs interposed in the course of the stream. The storage represented by a few inches rise and fall in the lake levels is enormous, and when withheld during the flood season and released in the dry season, it gives to the outlets a regimen of flow which is radically different from that of an ordinary river. This influence is not annual merely, but cyclic as well, and a series of what may be called wet years causes a general rise of mean level, the storage of which maintains the flow in the

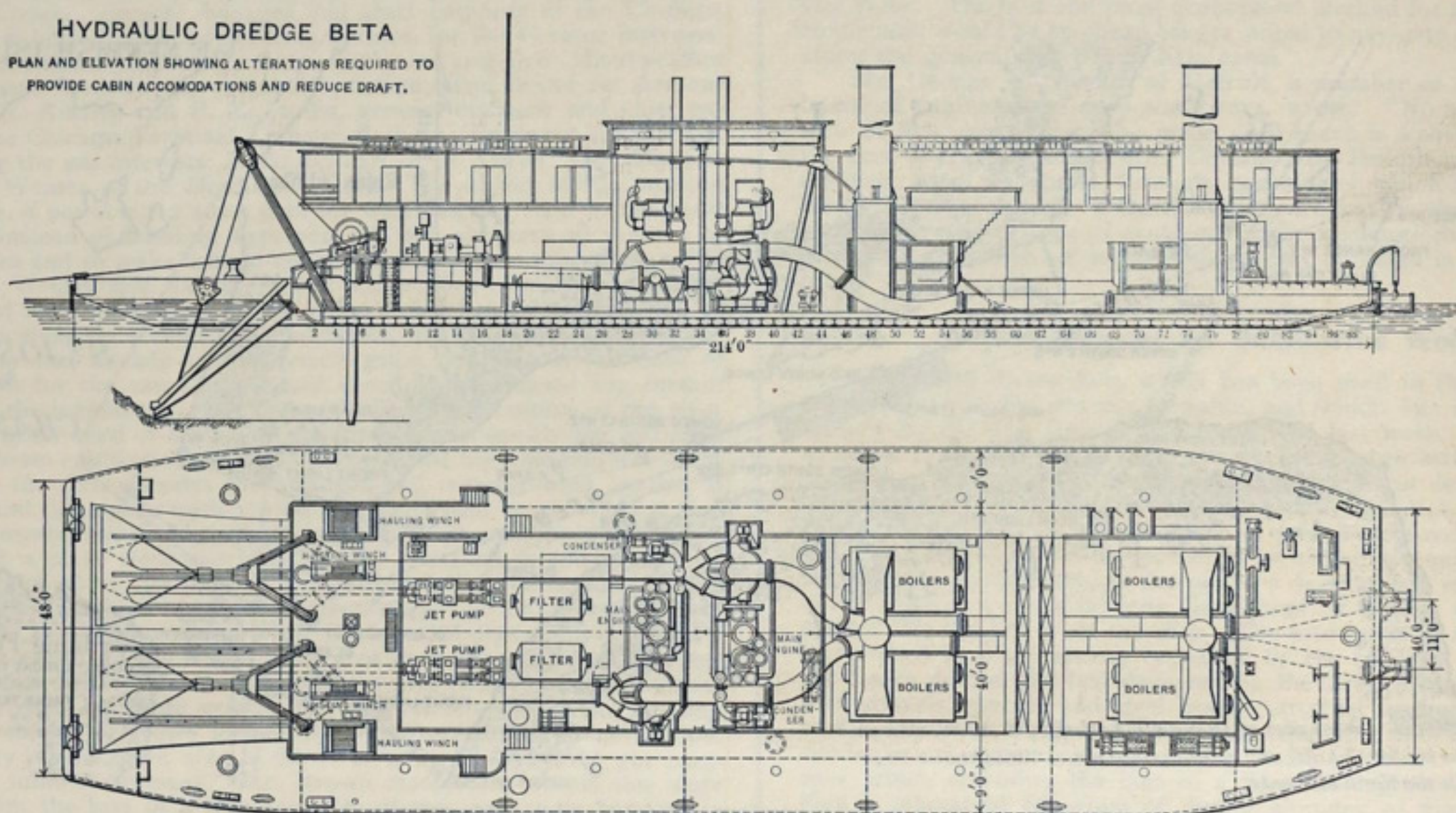
Huron, and a corresponding change in the volume of discharge. The volume of discharge, therefore, not only depends on the stage at the outlet but also on the relative elevation of the water surface of Lake St. Clair, but as the water surface of the latter follows the level of Lake Erie very closely, the discharge of Lake Huron will depend on the stage of that lake, and also on that of Lake Erie. If the level of Lake Erie be so regulated that the oscillations, aside from those due to winds, be reduced to a few inches, the area of the cross section of the outlet of Lake Huron, and the slope of the river through the gorge, would depend upon the stage of water at the outlet, and the fundamental formula used by the authors would then be applicable. It needs no mathematical demonstration to establish the fact that storage is absolutely essential to any system of improvement of our lake waterways based on the regulation of lake levels, and the studies which are now being made of this subject contemplate only such changes in the flow through the lake outlets as will produce the maximum benefit to commerce by controlling the discharge at Buffalo sufficiently to maintain a nearly constant level for the lake and at the same time rendering the storage in Lakes Michigan and Huron more effective, by making the discharge from Lake Huron depend on the stage of water in those lakes. The slope of the St. Clair, under present conditions, is greatest during the low-water season of the winter, but, with Lake Erie regulated, it would be a minimum in the winter, thus giving a maximum effect to the storage capacity of Lakes Michigan and Huron.

"The area of the lake reservoir system above Lake Erie is such that, for an average season, the inflow through the Detroit river would raise the level of Lake Erie 22 feet if not discharged, and the changes in the flow, which will be produced by regulation, will be so small, compared with those due to variation of precipitation and evaporation, that no injurious results can possibly arise.

"The author of the first part of the paper advocates placing regulating works directly in the outlets of lakes, such that the piers would con-

### HYDRAULIC DREDGE BETA

PLAN AND ELEVATION SHOWING ALTERATIONS REQUIRED TO PROVIDE CABIN ACCOMMODATIONS AND REDUCE DRAFT.



outlets during the ensuing years of less than average precipitation. The balance of forces which nature has here produced in the course of long ages is one of the most marvelous features of these lakes; and a careful contemplation of it cannot fail to convince one that an almost perfect compromise has been reached between the conflicting oscillations of lake level and outlet discharge. It is difficult to see how either could be brought nearer to absolute uniformity without a resulting depa ture in the other which would more than offset the gain."

Capt. Chittenden's expressed opinions, however, provoked a radical dissent by some of the engineers who for many reasons should be thoroughly conversant with existing conditions and influences on the lakes. They were ready to admit that Capt. Chittenden had made a very elaborate mathematical study of the problem but asserted that unfortunately, like many others not personally familiar with the physical characteristics of the lake system, he had based his formula on erroneous premises. Indeed, they claimed that some of the conditions which he assumed to exist are the very ones that the advocates of lake level regulation hope to produce by regulating Lake Erie. The greatest degree of importance attached to that portion of the discussion contributed by Mr. George Y. Wisner of Detroit, who has given the subject infinite study and whose occupancy of a place on the United States Board of Engineers on Deep Waterways clothed his statements with official significance. Mr. Wisner said in part:

"The St. Clair and Detroit rivers are simply connecting links between Lakes Huron and Erie, of which the surfaces fluctuate with the levels of the two lakes and with a slope depending upon the respective levels of each, and since the fluctuation of Lake Erie exceeds that of Lake Huron, the slope of the rivers is generally greater at the low stages of the lakes than at the high stages. A large per cent. of the fall from Lake Huron to Lake St. Clair (about 5.4 feet for mean stage) is at the outlet of Lake Huron (which at the gorge is only 750 feet wide), and any change in this fall due to unequal changes of levels of the respective lakes produces very decided changes in the slope of the rapids at the outlet of Lake

tract the cross section sufficiently to raise the lake level, and, by means of needle dams, control the oscillation of the lakes. It is certainly a fact that, if the gorge of the outlet be diminished in width, the mean level of the lake will be raised, and it is equally true that such contraction will increase the fluctuations of the lake level and thereby augment the evil we wish to correct, and at the same time cause great damage to the existing structures of the lake harbors. If the regulating works should be placed in the foot of the lake above the outlet, the water in the gorge below would rise and fall with the change in the discharge over the fixed dam, or through the regulating dam (either of which would accomplish the purpose), and thereby carry off the surplus water at the time that the lake in its natural condition would rise, and restrict the outflow during the remainder of the season, when, under the present conditions, the discharge through the outlet is greater than the supply.

"It is stated that 'The only way the effects of diversions can be counteracted is to contract the outlets, so that the flow through them at the normal mean level shall be diminished by an amount equal to the diversion.' The result of such a remedy would be worse than the evil it is intended to correct. It is a well-known fact that vessels on the lakes are constructed with reference to maximum navigable depth in our lake channels, and any improvement tending to increase the fluctuations in these depths would be very injurious to the lake commerce. The depth which may be obtained and maintained through our lake waterways and thence to the seaboard is not nearly of so much importance as that it shall be made nearly constant for the season of navigation through the channels from Lake Huron to Buffalo. This cannot be done by any contracting works in the outlets of the lakes, but can be by regulating works at the foot of Lake Erie; leaving the outlet unobstructed to take care of the maximum discharge, which would be approximately the same as under natural conditions. With the level of Lake Erie regulated, the discharge at the outlet of Lake Huron would vary with the stage of water in the lake, and, if it should then be found that the storage capacity of Lakes Michigan and Huron was in excess of what was needed, the fluctuations

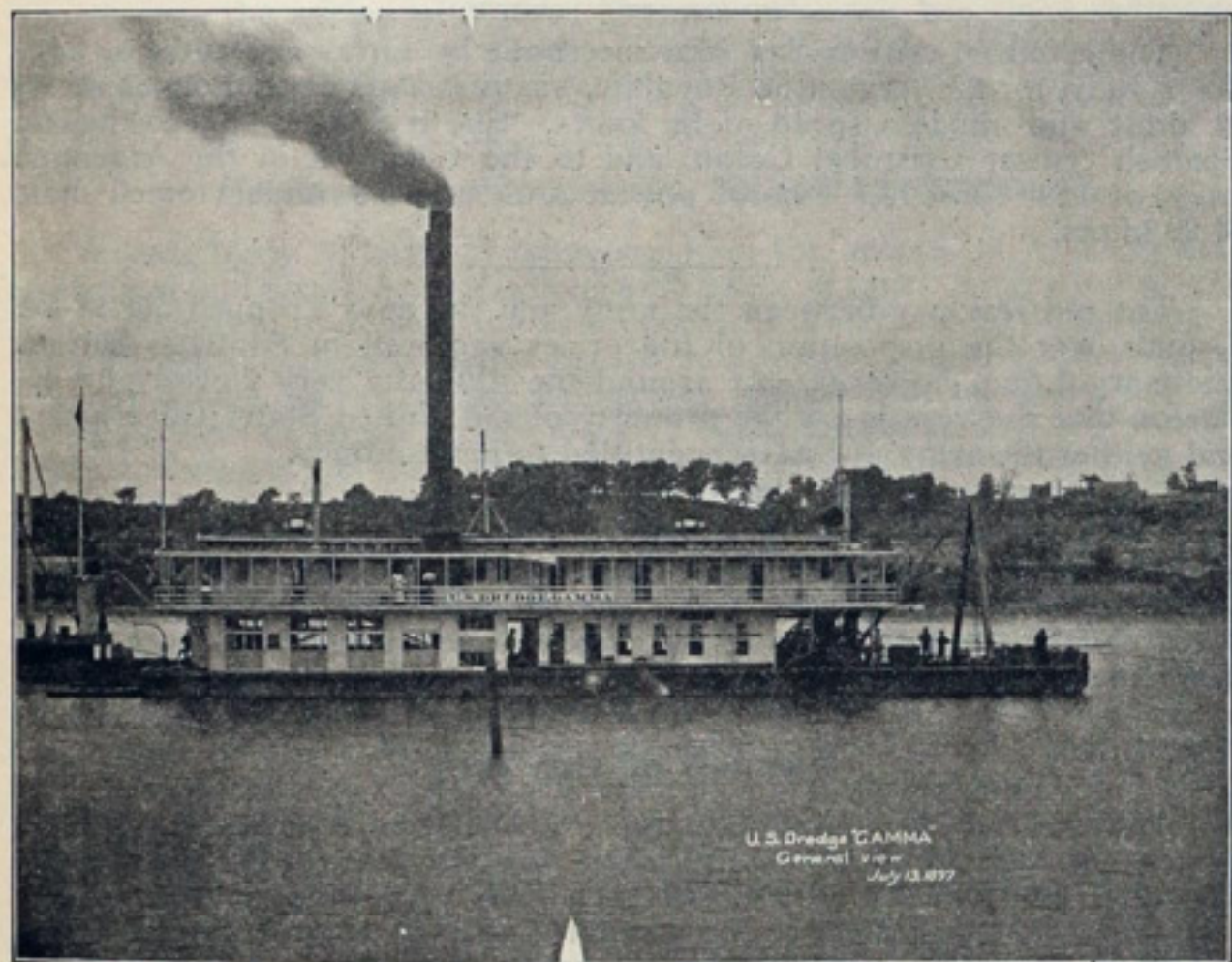


of those lakes could be reduced by enlarging the cross section of the gorge at the head of the St. Clair river.

"In the improvements, by dredging, which have heretofore been made in the St. Marys, St. Clair and Detroit rivers, the material excavated has been carefully deposited in the streams adjacent to the cuts for the purpose of maintaining the normal cross sections as established by nature, and it has been shown, theoretically, by several very elaborate reports, that these improvements could to no appreciable extent lower the slopes of these waterways; yet, in spite of these theoretical impossibilities, the water level below the locks at Sault Ste Marie is about a half foot less than for the same stage in Lake Huron before the improvements were made, and the slope to Lake Erie, for an average stage of the two lakes, is about 7 inches less than it was previous to the deepening of these waterways."

### Dredges and Dredging on the Mississippi.

A paper on "Dredges and Dredging on the Mississippi River," read before the Detroit convention of civil engineers, now in session, by Mr. J. A. Ockerson, is chiefly interesting to men connected with the shipping interests by reason of the very complete description which it contains of some of the more powerful dredges in use on the river. These dredges are of exceptional interest because of the heavy work required of them, and the fact that the character of material to be removed in various portions of the river differs so widely as to make the problem of treatment especially complex. Two of the dredges described in Mr. Ockerson's paper are illustrated herewith. The dredge Beta, which has two independent dredging machines complete, was constructed in 1895 by the American Hydraulic Dredging Co. of Chicago, Ill., at a cost of \$172,775. The contract provided that the dredge was to have a capacity of at least 1,600 cubic yards per hour. The sand pumps are of the centrifugal pattern with runners 7 feet in diameter and with eight arms in each runner. The suction for each pump divides near the forward end of the hull into three suctions, and each of these suctions is provided with a vertical revolving cutter with twelve nickel-steel blades, which serve to loosen up the material so that it



will readily enter the suction. They are driven, through a system of spur gearing, by a cross-compound, non-condensing engine having 14½ and 29-inch cylinders with 18-inch stroke. The engines make about eight revolutions to one revolution of the cutters. A pontoon is provided for each set of suctions. Each sand pump is operated by a direct connected, triple expansion, vertical, inverted, four-cylinder tandem engine; cylinders 20½, 33, 38 and 38 inches by 24-inch stroke. The engines are run at a speed of about 130 revolutions per minute, the indicated horse power being 1,250, with a boiler pressure of 175 pounds. Each engine is provided with a Worthington duplex air pump and jet condenser, with cylinders 14 and 19 inches by 15-inch stroke. The winding engines are placed near the bow of the boat. There are six drums, two used for side warping, two for pulling the dredge ahead and two for raising and lowering the suctions. At the stern of the boat is a steam capstan and spud hoist. This machinery is mounted on a steel hull 172 feet long by 40 feet wide, with 6½ feet draft. The work of making improvements on the dredge, including among other things the widening of the hull to 56 feet, is now in progress. The cutter engines and cutters will also be replaced by a jet suction and pumps, the whole necessitating an outlay of about \$41,000. The official test of this dredge showed an average capacity of 4,920 cubic yards per hour, and the contractor therefore earned a bonus of \$86,387.50.

The dredge Gamma, probably next to the Beta the most interesting dredge described by Mr. Ockerson, was completed last year at a cost of \$85,530 by the Bucyrus Steam Shovel & Dredge Co. of South Milwaukee, Wis. The hull of the Gamma is of steel, 138 feet long, 38 feet wide and 8 feet deep. The main dredging pump is located in the forward part of the engine room. It is a centrifugal pump, with a 24-inch suction inlet on each side and a 34-inch discharge at the bottom. The engines develop 500 horse power with a boiler pressure of 140 pounds. The jet pump is of the centrifugal type, with 18-inch suction and discharge. This pump supplies the water to stir up the sand at the suction head. This pump and its engine rest on a common bed plate, and have a flange-coupled shaft for pump and engine. The engine is a compound condensing engine of the marine type. The high-pressure cylinder is 12 inches and the low-pressure 22 inches in diameter, with a common stroke of 14 inches. The general efficiency test, called for by the contract, required that the dredge should be operated sixty working days of twelve hours each in

water from 5 to 15 feet deep, and with sand at such different degrees of coarseness as will be found on the low-water bars. After this had been done and the machinery found satisfactory, twenty capacity tests were required to be made with the suction at different depths. This last requirement was considered filled when the total amount pumped per hour divided by twenty was equal to or exceeded the required capacity of 800 cubic yards per hour.

### Erie Canal No Longer a Factor in the Grain Trade.

Buffalo, N. Y., July 26.—Complaint was made by advocates of canal improvement when it was said in the Review, not long ago, that the loss of business in the canals this year indicated, more than ever, the hopelessness of these waterways trying to compete with the railways while subject to all manner of political influences, as indicated by the disastrous outcome of the recent \$9,000,000 expenditure.

Canal men, who early in the season were considerably discouraged by the numerous and serious delays caused by breaks in the Erie canal, and which prevented the opening of traffic until May 7, are still further disappointed by the poor showing made as to the aggregate movement of grain up to date. Last season, it will be remembered, was far from a satisfactory one, but it was nevertheless considerably better than the showing made so far this year. The fact that the quantity of grain carried by canal to date is much less than for the corresponding period last year is particularly distressing to the canal men, in view of the fact that the total shipments from Buffalo by rail and canal are far in excess of those in 1897. Reports of the New York Produce Exchange give the quantity of grain sent from Buffalo to New York by canal from May 1 to date as 5,452,684 bushels. This is only one-seventh as much as the railroads carried during the corresponding period, the latter figures being 37,323,004 bushels, giving a total movement to date of 42,775,688 bushels. For the corresponding period in 1897 the canal movement aggregated 7,238,100 bushels and the rail movement 28,361,809 bushels, a total of 35,599,909 bushels. It will thus be seen that although the total receipts of grain at New York show an increase of 7,000,000 bushels, this year, the canal receipts fell off 2,000,000 bushels, while the rail receipts show an increase of 9,000,000. Generally, this falling off has been attributed almost wholly to the breaks in the canal, yet in candor it must be admitted that there was a similar delay in opening the canal last season. This sort of thing will naturally have a tendency to disgust shippers, especially when, as has been the case in certain instances this year, some grain orders shipped by canal had to be duplicated by rail by reason of the detentions due to breaks, even after the opening of the canal.

### Improvements at Manitowoc.

Manitowoc, Wis., July 27.—The Goodrich Transportation Co. is about to enlarge its already extensive machine shops and warehouse property at this port. The machine shop, which adjoins Berger & Binger's ship yard, was built last year and is 76 feet in length by 25 feet in width. This shop will be doubled in size, the addition being made on the west side. A new boiler and boiler house will be erected, and, adjoining it, a foundry. A dynamo plant for lighting purposes will be installed and wires led to the vessels for lighting purposes in winter when they are laid up for repairs and overhauling. There will also be a large fire engine for the protection of vessels and buildings, as the site is somewhat out of the way for fire protection from the city. On the east side of the machine shop, and 22 feet from it, will be erected a carpenter shop 60 feet by 44 feet in size, parallel to Center street, and 18 feet from it. The present shop, 43 feet by 22 feet, will remain as it is, about 14 feet east of the site for the new shops. The shop will have planing machine, band saws, circular saws, turning lathes and finishers. At the Goodrich company's freight warehouse down town the alteration will include an addition of over 200 feet to the length of the already extensive warehouse. The coal dock sheds will be moved out toward the beach line to make room for the warehouse addition. The cost of this work is estimated at about \$40,000.

### Dunkirk as an Ore Port.

Dunkirk, July 27.—The work of improving the harbor at this port is being pushed rapidly forward. Nine dredges are now at work. Representative Hooker of this city, when chairman of the river and harbor committee of the house of representatives, saw to it that a good-sized appropriation was made for the improvement of the harbor here under the continuous contract system, and it is evident that with the completion of this work Dunkirk will have one of the finest harbors on the lakes, the uniform depth being 18 feet. A number of men connected with the shipping interests express confidence that this place will yet develop into an ore receiving port of some prominence, and there is a rumor afloat to the effect that negotiations looking to the construction of ore and coal docks are already in progress, but this cannot be substantiated. Masters of vessels entering Dunkirk harbor are warned that in view of the condition of the work, they had best keep well to the westerly until the mill at the foot of the first lumber dock is in range with the light-house on the breakwater, and then haul in.

When freights were high and lake ship builders were making money, a few years ago, some of the steel steamers built for the ore and grain trades were provided with cabins that were equal in most respects to the best quarters on first-class passenger vessels. Hardwood finish, large bath rooms, costly carpeting and furniture and other luxuries were provided on nearly all the steel vessels built up to 1895. Both builders and owners went to extremes. It was found that fine things in a furniture line did not harmonize with coal dust and the red paint substance in ore. Of late it would seem that the extreme has in some cases been in the other direction—poor outfits on several of the big vessels. But this is not the case with the steamer Presque Isle, managed by Mr. W. G. Mather of Cleveland, and which left the yard of the Cleveland Ship Building Co. at Lorain a few days ago. Her cabins are elegantly finished. There are six bath tubs aboard the Presque Isle, including one for deckhands and firemen.





DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

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The books of the United States treasury department on June 30, 1897, contained the names of 3,255 vessels, of 1,410,102.60 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1897, was 399, and their aggregate gross tonnage 769,366.68; the number of vessels of this class owned in all other parts of the country on the same date was 314, and their tonnage 685,709.07, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1897, was as follows.

	Number.	Gross Tonnage.
Steam vessels .....	1,775	777,235.45
Sailing vessels and barges .....	1,094	294,888.87
Canal boats .....	361	37,978.28
<b>Total .....</b>	<b>3,230</b>	<b>1,410,102.60</b>

The gross registered tonnage of the vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
" " " 1896.....	117	108,782.38
" " " 1897.....	120	116,936.98
<b>Total .....</b>	<b>611</b>	<b>403,327.91</b>

ST. MARY'S FALLS AND SUZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canals.			Suez Canal.		
	1897	1896	1895	1897	1896	1895
Number of vessel passages.....	17,171	18,615	17,956	2,986	3,409	3,434
Tonnage, net registered.....	17,619,933	17,249,418	16,806,781	7,899,374	8,560,284	8,418,383
Days of navigation.....	234	232	231	365	365	365

It would seem that some way should have been devised to secure to steamship companies more in sympathy with American interests than the Campagne Transatlantique Espanola the contract for the transportation of the 22,000 captured Spaniards from Santiago to Spain. The successful bidder is a licensed corporation of a nation with which we are at war, and as, by a measure passed by the Spanish cortes, one-half of the receipts of every corporation doing business under the Spanish government must be surrendered to that government to defray the expenses of the war, we are placed in the decidedly ambiguous position of supplying funds to be used in waging war against us. This, too, in the face of the fact that several steamship companies among the bidders in this country have in no small degree inconvenienced themselves to supply transports or other requirements to the United States government, or have at least offered to do so. Added to all this is the circumstance that by the terms of the agreement the government releases from blockade all of the enemy's vessels to be used in this transportation from the neutral ports where they are now in shelter, thus depriving our navy of some possible prize money that would no doubt be welcome and is certainly deserved in view of the achievements of our vessels in every engagement in which they have participated.

In a recent discussion on naval subjects one of the officials of the Wm. Cramp & Sons' Ship & Engine Building Co. is quoted as saying: "The best of the Spanish vessels were built by Scotch engineers in Spain and I may say in this connection that the Cristobal Colon, their one very fine ship, is as good as any vessel of her class which has been built. Most of the Spanish vessels, however, have been built slowly with the laziness characteristic of the race and have come out behind time and antedated as far as improvements are concerned. It is a fallacy, too, that these vessels can outsail ours. The Spanish trial course is a measured mile and the engineers get up steam before they strike the mile post and are ready for a short dash; then they enter the ship as capable of continuously making that speed, whereas on the other hand we take the average of a series of miles. The fact is that American twin and triple screw steamers have no equals anywhere. The Germans have not had the success with their warships that they have had with their passenger vessels."

The French line is having built at St. Nazaire two new steamships which are to make 22 knots or more. They are to be known as La Lorraine and La Savoie, and each will cost about \$3,000,000. The length will be 550 feet; beam 58 feet and depth of hold 40 feet. There will be two engines, developing about 25,000 horse power, which will drive twin screws. It will be two years before these vessels will be completed. In anticipation of the building of these vessels the French senate on July 3 passed a bill awarding the mail contract between New York and France to the French line for ten years, dating from 1901, on condition that the steamships make fifty-two trips a year at an average speed of 20 knots. In 1903, it is planned, the French line will have another passenger and mail steamship of 23 knots' speed, and in 1905 a fourth vessel still faster.

Revenue cutter officials seem to have come off victorious in their little tilt with the navy department relative to the proposition to change the name of the revenue cutter Algonquin, now on her way from the great lakes to the coast. When the vessel was transferred from the revenue cutter service to the navy department, the officials of the latter wished to call the vessel the Acamac, because of the presence on the Atlantic

sea coast of the tug Algonquin, the theory being that two boats of the same name would cause confusion. The revenue officials, however, held out in their opposition to the change, and it has finally been decided that the vessel shall continue to bear the name of Algonquin.

Ore concentration at the Pewabic iron mine, Menominee range, Michigan, is proving successful. About 150 tons of ore per day are treated, and, when the plant is at work night and day, double this quantity will be run through. The ore is brought direct from the mine's mouth by rope haulage and is crushed, washed and jigged, and comes out with an average of about 64 iron and barely a trace of phosphorus. All the water from the mine is used in the washing except that needed in the boilers. The entire horse power for the concentration is about 100, and it is expected that less than 140 men will be employed in mining and reduction when the works are in operation both day and night.

There is one matter in connection with the export trade in iron and steel which is referred to quite often among merchants and manufacturers, but which thus far has not been given expression to publicly. Our producers have been so long accustomed to a standard of large transactions that the run of foreign inquiries look rather small in comparison. The fuss made over the latter is often annoying, yet our manufacturers should realize that our standards of magnitude do not apply to the majority of other countries, that what is small to us is big to them, and that we should look at the business more from their standpoint.—Iron Age.

A new record was broken on the Tyne in England, a few days ago, when the Armstrong Co. launched on three successive days, three ships of war, all of large tonnage and of different types. One of the vessels was the cruiser Fourth of July, the second the Chilean training ship, General Baquedano and third the cruiser-battleship Tokiwa, designed for the Japanese. Never before has any private ship building firm or government dock yard been able to achieve such a feat. The cruiser Fourth of July will probably be sold to the Japanese government, but this is not definite as yet.

The armored cruiser San Martino, built by Orlando Brothers, Leghorn, Italy, for the Argentine Republic, has just had her trial under natural draft and made a speed of 18 knots. She is a sister ship to the late Spanish cruiser Cristobal Colon, and to the Garibaldi in the Argentine navy, of 6,840 tons, 13,000 horse power, and a speed under forced draft of 20 knots.

The old jealousy between the army and the navy cropped out in the dispute over the disposition of the prizes captured in Santiago harbor. Secretary Long, however, got around the difficulty very cleverly by declaring that the vessels are the property of the United States Government and neither the army nor navy is entitled to prize money.

European vessels are now being fitted with a new type of rudder, formed of several circular plates so arranged that the supporting shaft passes through their center, thus forming a balanced rudder which extends equally on both sides of the ship and relieves the pressure of the water in turning.

### Launch of the Troy.

The steamer Troy, building for the Western Transit Co. and the largest package freighter on the lakes, was launched at the yard of the Detroit Dry Dock Co. a few days ago with very little ceremony. The traditional bottle of champagne was lacking and not a flag waved from the hull. The vessel was named the Troy, after the New York city of that name, at the suggestion of President Calloway of the New York Central railroad. She is 402½ feet in length, 42½ feet beam and 28 feet molded depth. It is estimated that she will carry 5,250 net tons on a draft of 17 feet. Her quadruple expansion engines, working at a steam pressure of 210 pounds, are expected to enable the vessel to attain a speed of 13 miles per hour. There are seven gangways, all above the 16-foot water mark, and hatches are of 24 feet centers. The vessel, which cost in the neighborhood of \$225,000, will have a hoisting shaft running her entire length, operated by two engines, and two complete electric lighting plants. The Western Transit Co. has implied a considerable compliment in awarding to the Detroit Dry Dock Co. the contracts for all the vessels which it has had constructed in recent years. The Western liners built at Detroit include the Boston, Albany, Syracuse, Hudson, Harlem and Mohawk, and now the Troy. The work of completing the latter vessel will be rushed, and it is claimed that she will be in commission inside of six weeks.

### Rockefeller and Merritt Interests on the Mesabi.

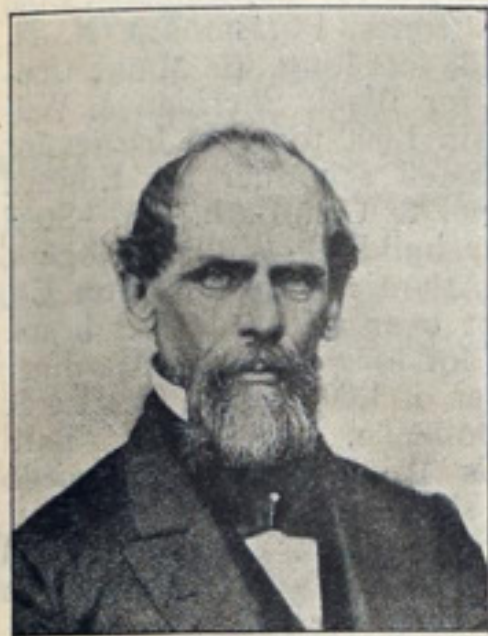
New light is thrown on the circumstances connected with the acquirement of the Merritt interests on the Mesabi range by John D. Rockefeller in a recent letter from a Duluth correspondent. He says:

"It appears that the second mortgage bonds of the Mesabi company, which were taken by Mr. Rockefeller in the winter of 1893-94 in the height of the money panic, and by which the Merritts have always claimed they lost their possessions on the range, were in reality a third lien on the road and bore 4 per cent. interest. They were taken by Mr. Rockefeller at 60 cents on the dollar, but the Merritts had the option of retiring all or any part of them at 75 within three years, within six years at 85, and so on. These bonds were taken by Mr. Rockefeller and the money necessary to preserve the road from bankruptcy was advanced by him thereon at a time when great capitalists were borrowing money in New York at 10 per cent. I am informed on the highest authority that all these bonds have been retired at considerably less than par. I am also told that a considerable amount of the stock of the Lake Superior Consolidated Iron Mines, the Rockefeller company, has been bought by the company and canceled, and that a considerable amount more of the authorized capital of \$30,000,000 has never been issued."



### An Illustrious Name for a Lake Craft.

The second of the large barges building for the Bessemer Steamship Co. at the Wheeler yard, West Bay City, and which will be launched within a few weeks, will be known as the John A. Roebling, as a compliment to the memory of one of the greatest engineers that America has known.



No man, certainly, has a more magnificent monument than the Brooklyn bridge, which stands as the memorial of its designer. Mr. Roebling advanced the project of this remarkable structure in the early fifties. Unfortunately, he lost his life June 17, 1869, at the very inception of the actual construction of this work, which was to have been the crowning achievement of his career. Luster is added to his name, however, by other achievements almost as remarkable. In the face of the opposition of the most expert talent of the time, Mr. Roebling built at Niagara Falls the first railway suspension bridge ever constructed. The Allegheny bridge crossing the Allegheny river at Pittsburgh and the Ohio bridge at Pittsburgh are also tributes to his skill. Mr. Roebling was the first engineer to introduce into America a wire rope

tramway in connection with the transportation across rivers of the wires which he used in the manufacture of cables for his suspension bridges. Now more than twenty types of Roebling cableways are in operation in all parts of the world, including that at Caperton, West Virginia, having a clear span of 2,077 feet, the longest single span cableway in America. The above facts are gleaned from a very handsome volume in the form of a history and price list which the John A. Roebling Sons Co. has just issued to commemorate the fiftieth anniversary of the establishment of the works of the firm at Trenton, N. J. Mr. John A. Roebling began the manufacture of wire rope at Saxonburg, Pa., in 1840, and transferred the plant in the spring of 1848 to Trenton, where it has since remained. The manufactory is now the largest of its kind in the world and covers 22 acres of ground, and regular employment is given to over 2,500 employees.

### British Supplementary Naval Program.

Events likely to have an influence upon the actions of naval powers, both great and small, have followed each other in quick succession of late. The most recent of these is the announcement in parliament of the supplementary naval program of the British admiralty. The original program was, of course, based on the two-power system—the principle that the naval strength of Great Britain must be equal to that of any two possible foes—and was, at the time it was framed, believed to be entirely adequate. Since that time the announcement has been made that Russia will this year commence work on six new battleships. Hence the change in the British plans. The original program made provision for the construction of only two new battleships, and the supplementary measure asks for an appropriation sufficient to increase this to six. It was also shown that whereas the Russian program provides for four cruisers, the new British plans parallel it, and in another respect exceed it, for the new program also makes provision for the construction of twelve torpedo boat destroyers. The estimate submitted indicates that the new program will entail an increase of \$40,000,000 in expenditure, making the total appropriation \$75,000,000. The effect of the present action upon this country will unquestionably be largely moral in character yet no one will deny the probability of these expenditures having some influence in America, when taken in conjunction with the lessons of the present war. It is interesting to note, too, that the British officials do not seem to have been influenced in any degree by the disparaging estimate placed on torpedo boats and destroyers as a result of their delinquencies in the present difficulty. A moment's consideration may also be given to the careful provision that the battleships for which the British desire to provide are to be especially adapted for the passage of the Suez canal. This would seem to indicate the trend of the opinion of the admiralty as to a probable seat of trouble.

### Board of Survey Recommendations.

Many convictions regarding the most approved methods of construction in naval vessels have been deduced as a result of the investigations of the board of survey which has examined the wrecks of the vessels of Cervera's fleet at Santiago. Among the recommendations upon which the board has laid the greatest stress are the following: That no wood shall be used in the construction of battleships; that the fire mains should be placed entirely below the protective deck; that if torpedoes are carried they should be below the water line; and that rapid-fire batteries are of the greatest importance. The first recommendation is likely to be modified before adoption by the navy department to the extent of allowing the use of fireproof wood. A discussion of this phase of the question, embodying the views of Chief Constructor Hichborn, will be found in another column. The second suggestion is prompted by the experience of the Maria Teresa. Shortly after she left the harbor her cabins were set on fire by a shell, and when the engine room was signaled to start the pumps it was found that the fire mains, which were above the protected deck, had been broken by a shell. The opinions advanced regarding the storage of torpedoes is resultant from the fact that the bow of the Vizcaya was blown open by her own torpedoes, the explosions being induced either by a blow from a shell, the heavy concussion, or the heat to which they were exposed. The creditable showing made by the rapid-fire batteries and the clear indication of the importance of affording gun crews adequate armor protection must, of course, be apparent from even a casual reading of the accounts of the engagement.

It is claimed that no single pier in the world can accommodate more vessels than the one at Port Tampa, where recently forty transports and other steamers were loaded at one time.

### Record of a Lake Superior Copper Mine.

The appearance recently in the Review and other publications of articles relative to the Calumet & Hecla copper mine has called attention to the magnitude of the Tamarack copper mine which adjoins the Calumet property. The Tamarack mine has at present the distinction of having the deepest mining shafts in the world. There are five shafts, No. 1 being 2,240 feet deep; No. 2, 3,775 feet; No. 3 is 4,526 feet; No. 4 is 4,450 feet deep, and No. 5, which is now down 2,450 feet, will be, when completed, nearly 5,000 feet in depth. The company's property is immediately west and north of the Calumet & Hecla's, and it was forced to sink deep vertical shafts in order to penetrate the copper-bearing conglomerate in its downward dip of about 38 degrees. No. 3 shaft reached the lode at a vertical depth of 4,185 feet; No. 4 found it at 4,393 feet. The first shaft sunk, No. 1, was further north than Nos. 3 and 4, and struck the conglomerate sought at a depth from surface of 2,270 feet.

A hoisting plant that is being installed at shaft No. 5 will be of a type new to the Lake Superior country. There will be four engines, one at each corner of the great frame. They will be set in an inclined position, cylinders being 32 inches diameter and 56 inches stroke. The drum will be tapered at both ends, running from 16 feet at end to the straight face of drum, which is 25 feet diameter. It is claimed for this four-cylinder type engine that it will start the load readily and smoothly, and give the highest efficiency.

According to the report of this company for 1897, there was hoisted from the mine a total of 726,665 tons of rock, of which 611,539 tons were stamped. This gave 29,580,380 pounds of mineral, yielding 20,222,559 pounds of ingot copper. The copper yield was 1.65 per cent. of the rock stamped. The total cost of working in 1897 was \$2.07 per ton of rock stamped. The new stamp mill of the company has seven heads, all with solid foundations and 20-inch cylinders. The daily performance per head for actual running time was 332.95 tons per day.

### Chief Hichborn Favors Fireproof Wood.

Evidence to the effect that the destruction of Admiral Cervera's fleet was due in a great measure to the fire and smoke generated by the explosion of American shells has induced Chief Constructor Philip Hichborn of the United States navy to again take up the subject of fireproofing all wood in naval vessels, particularly torpedo boats and torpedo boat destroyers. Fireproofed wood was introduced in a number of our vessels following the lessons taught by the Chinese-Japanese war, but objections were discovered, particularly the disagreeable odor which emanated from the chemicals in the wood, and which made life on board the ships almost unbearable, and it was abandoned. Now with the present illustration of the dangers of unprotected woodwork, the matter is again to be considered, and the secretary of the navy has decided to reconvene the special board which was appointed some time ago to deal with the question and which recommended that the use of the prepared wood be curtailed in some measure in the building of American warships.

In speaking of the matter Chief Hichborn said: "The great lesson of the present war is the necessity of building vessels whose woodwork shall be fireproofed. The Japanese-Chinese war indicated the desirability of such action, but I think the destruction of Cervera's fleet proves the importance of fireproof wood on board men-of-war. All reports of the battle show conclusively that the flame and smoke from the explosion of American shells stifled the Spanish gunners, causing them to desert their guns and run their vessels ashore in order that they might escape. This is true not only of the armored cruisers but of the torpedo boat destroyers. Foreign governments are using fireproof wood in vessels now building, and I received authoritative information a short time ago that the Dutch government has placed orders in this country for fireproof wood for torpedo boat destroyers under construction."

### Enormous Appropriations for Liverpool Docks.

Liverpool's plans for providing suitable dock accommodations for the big ships that have of late been built in England and Germany are attracting attention all over the world. Two acts have just been passed by the British parliament authorizing further appropriations for the completion of the Liverpool dock system, regarding which much has already been written. The total amount authorized by parliament to be spent on these improvements is larger than the sum originally estimated. The exact total provided for in the two acts is \$24,115,320. Of this amount \$6,804,000 is supplementary to the sum of \$7,776,000, authorized by a special act of 1891, to be expended for extending, deepening, and otherwise improving the docks. These improvements are nearing completion. Under the act of 1891, and the two acts just passed, there have been authorizations for the enormous expenditure of \$31,891,320 for the improvement of the Liverpool docks. Even this amount does not give the grand total. The acts of 1891 and 1898 are for special and extraordinary improvements; and, in addition, there are the ordinary improvements made from time to time and paid for out of the current revenue of the board.

James Boyle, United States consul at Liverpool, in a communication to the state departments, reports that the last of the sailing pilot boats at Liverpool has been withdrawn from service. Formerly there were six sailing pilot boats, but now four steamboats perform the service. These steam pilot boats are very swift and strong. Two of them have a tonnage of 274 tons and two of 275 tons. All of them have a draft of 10 feet. They have been specially built to enable them to stand any sea.

Recently there was launched from the ship building yard of Messrs. Robert Stephenson & Co. in England a large steel derrick pontoon, built to the order of Messrs. W. Cory & Son of London. This pontoon, which is 506 feet long, 47 feet 6 inches extreme width, and 12 feet 6 inches molded depth, is to be placed on the Thames for the discharging and loading of coal. The hydraulic power is supplied by three large pumping engines, and a large accumulator is placed at each end. In addition to the nine hydraulic grabs, there are to be six powerful hydraulic warping capstans and rollers for warping the barges into position. Steam is supplied to the pumping engines, pumps, etc., by four large marine-type boilers.



### Rush of New Work in the Ship Yards.

Capt. N. F. Mason, Jr., of 25 South street, New York, is building the steamer Dewey at Tottenville, Staten island.

Joseph Thomas & Son of Baltimore, Md., will within a short time begin work on a large steam vessel for E. J. Bergen.

Messrs. R. T. Potter, William Schofield and G. W. Potter are building at Seattle, Wash., a speedy steam yacht for service on the Yukon river. She is 80 feet long and 16 feet beam.

A four-masted schooner, the Honoipu, has just been launched at the Alameda ship building yard at Alameda, Cal. She is 162 feet long, 37 feet beam and 13 feet deep.

The Union Dry Dock Co. of Buffalo has closed a contract with T. A. Gillespie & Co. of New York for the construction of two wooden dredges. They will be 103 feet in length by 34 feet beam.

Work is progressing on the torpedo boat Stringham, now in course of construction at the yard of the Harlan & Hollingsworth Co. at Wilmington, Del. The launch is set for Sept. 1.

M. Zier & Co. of New Albany, Ind., will furnish boiler 28 feet in length by 42 inches in diameter with two flues for the Cincinnati & Louisville Mail Line steamer now building at Cincinnati.

Haskell & Crawford of Tacoma, Wash., have secured from Messrs. C. Wyman and F. W. Bebbs the contract for a steamer to replace the Sophia for service on Puget sound. She will be 90 feet in length and speedy.

The Van Aken Co. of New York city has secured the contract to construct wharves and docks at the port of Santiago de Cuba and elsewhere on the Cuban coast. The company has just been incorporated with a capital of \$80,000.

A. D. Story, Essex, Mass., has two schooners on the stocks. During the past six months he has built nine small schooners. James & Tarr, the other ship building firm at Essex, have, during the same period, turned out a small steamer and four schooners.

The Portland Ship Building Co. of Portland, Ore., has under construction for the Oregon City Transportation Co. the steamer Pomona, 130 feet long, 26 feet beam and 4½ feet deep. She has two engines with cylinders 12 inches in diameter and 48-inch stroke, and boilers with a steam pressure of 200 pounds.

The growth of the ship building business of the Bertram Engine Works Co. at Toronto, Ont., has induced the firm to commence work on a new two-story machine shop and a two-story storage shed. Mr. George Bertram states that employment is now being given regularly to over 700 men, more than double the number employed at this time last year.

The Roach ship yard has secured from Richard Stevens of Hoboken, N. J., the contract for a new steam yacht which will be an almost exact duplicate of the Malay, now nearing completion at Chester. The Roach people some time ago built the Aileen for Mr. Stevens, and he now desires to replace that vessel, which he sold to the government. The new yacht will be delivered next summer.

William E. Woodall & Co. of Baltimore will, when work has been completed on the tug which they are now building for the Boston Tow-boat Co., lay the keel for a large steam barge, which they will build for stock. Both vessels will be fitted with engines and boilers built by the Campbell & Zell Co. of Baltimore. The latter firm is also providing an engine and boiler for the 100-foot tug building for P. Dougherty & Co.

The Neafie & Levy Ship & Engine Building Co. of Philadelphia is hurrying work on the tugs building for the Moran Towing Co. The De-Witt C. Ivins is nearing completion; the Albert C. Booth has been launched, and the third tug, it is now expected, will be ready for delivery in September. Other vessels building at this yard are a tug for the Peter Cahill Towing Co. of New York and a boat for the Pilot's association of Delaware city.

The Harlan & Hollingsworth Co., Wilmington, Del., has secured the contract for the second new vessel for the Merchants' & Miners' Transportation Co. of Baltimore. She will be 274 feet in length and similar to the other vessels built by Harlan & Hollingsworth Co. for the line. The new vessels have been made necessary by the sale of four steamers to the government. The keel for the first of the two new vessels will be laid within a few days.

Reports this week from the yard of the William Cramp & Sons Ship & Engine Building Co. at Philadelphia are to the effect that the 3-inch wooden deck of the battleship Alabama is being put in place. No armor plates have as yet been put on. No construction work has been commenced on the Russian war vessels for which the Cramps have the contract. New operations are probably delayed on account of improvements to be made in the yard.

The passenger steamer Old Glory has been launched at the Palmer ship yard at Noank, Conn. This steamer, which is building for Capt. James F. Smith, is 140 feet in length, 27 feet beam and 9 feet depth. She will have two triple expansion engines with cylinders of 10, 15 and 26 inches and two Almy water tube boilers tested to 250 pounds pressure.

The steamer Apollo No. 1 was launched a few days ago at Kilbourn, Wis. She will cost \$5,000.

Ship building at Portland, Ore., has, during the past year, attained a degree of activity never before reached in the history of the port. The Wolff & Zwicker Iron Works, which now has under construction the torpedo boat Goldsboro, 196 feet in length by 20 feet beam and to cost \$214,000, have, during the past year, launched the torpedo boats Davis and Fox and two United States light ships, as well as a tug. Hale & Kern have had under construction four barges, each 180 feet in length by 46 feet beam and costing \$75,000; Joseph Paquet has been busy with two steamers, each 175 feet in length by 36 feet beam and costing \$85,000 each, together with the dredge Lavelle Young; the Portland Iron Works have had the \$150,000 Portland dredge; Joseph Supple has turned out eleven vessels, including a government barge, three dredges and several steamers for the Klondike trade; and finally, as mentioned elsewhere, Johnson &

Oleson—the Portland Ship Building Co.—have under construction the Pomona.

With all circumstances considered, the activity at present almost universal in the Maine ship yards is almost unprecedented. Leading firms now have under construction or contract vessels as follows: New England Co., Bath, Me.—Four-masted 1,100-ton schooner for Capt. Lucius J. Stevens of Clinton, Ct.; three 1,600-ton coal barges for Consolidated Coal Co., Baltimore; passenger steamer for Frank Jones, Portsmouth, N. H. Kelley, Spear & Co., Bath, Me.—Ferryboat, 138 feet long, for Maine Central Railroad Co.; two 1,600-ton coal barges for Black Sheridan & Wilson Co. of Baltimore, Md.; one 500-ton and six 1,600-ton coal barges for Staples Coal Co., Taunton, Mass.; four-masted schooner for Edward Smith & Co., Brooklyn, N. Y. Arthur Sewall & Co., Bath, Me.—Steel sailing vessel of 3,000 tons to be managed by builder. William Rogers, Bath, Me.—Three barges of 1,690 tons for Atlantic Transportation Co. N. T. Palmer, Bath, Me.—Schooner, 300 feet over all by 44 feet beam. Charles Harrington, Bath, Me.—Steam yacht for local owners. Gardiner G. Deering, Bath, Me.—Four-masted schooner of 1,600 tons. Charles S. Minot, Phippsburg, Me.—Four-masted schooner of 1,500 tons. Bath Iron Works, Bath, Me.—Steel cargo steamer Winnifreda; two torpedo boats for United States government; training ship for United States naval academy; steam yacht for Col. Oliver H. Payne, New York. Thomaston, Washburn Bros. & Co.—Four-masted schooner of 1,200 tons for Capt. Hamilton of Rockland, Me. Dunn & Elliott, Bath, Me.—Four-masted schooner of 1,100 tons. H. M. Bean, Camden, Me.—Four-masted schooner of 1,775 tons net for Capt. J. G. Crowley of Taunton, Mass. Sawyer Bros., Millbridge, Me.—Four-masted schooner of 1,000 tons.

### Around the Lakes.

Mr. George W. Short, president of the Excelsior Iron Works Co. of Cleveland, died last Saturday evening, at the Jackson sanitarium, Dansville, N. Y.

Capt. Benjamin Cole died at his home in Detroit, Sunday afternoon. Capt. Cole had at one time or another been master of the schooners Dolphin, Mouse, Poland, Ograitte, India, Melbourne and Wayne.

Mr. W. J. White of Cleveland, owner of the steam yacht Say When, informs the Review that no definite arrangements have as yet been made for the race between that vessel and the yacht J. I. C. of Detroit, although there has been some correspondence on the subject.

Inspector Hanford of the tenth light-house district has given notice that the 25-foot spar buoy, painted in red and black horizontal stripes, which has heretofore marked Round island shoal, St. Lawrence river, will be discontinued August 15. The shoal which it marked has been removed by dredging to a depth of 18 feet.

Announcement is made by the light-house board that beacon lights have been re-established to mark the lower reach of the 20-foot channel in the southwesterly part of Lake St. Clair (Grosse point), as noted in a recent communication in the Review from Major Adams, light-house engineer at Detroit.

A correspondent asks for names of officers of the Inman Tug Co. of Duluth. They are as follows: President, J. H. Sessions; vice-president, M. H. Loutelle; secretary and treasurer, M. H. Wardwell; manager, B. B. Inman. The board of directors is composed of the foregoing officers and F. M. Parsons.

Congressman T. E. Burton of Cleveland informs the vessel owners through Mr. Harvey D. Goulder that, although the attorney general has not as yet given out a written opinion as to the charter tax, the internal revenue department expects it to be exactly in line with the oral opinion of the commissioner of internal revenue, which was to the effect that no charter tax is to be paid by vessels engaged in internal commerce.

More improvements in the Carnegie ore docks are to be made shortly at Conneaut. The dock company has purchased all property suitable for dock purposes on the side of the river opposite the present system of docks. Arrangements will undoubtedly be made for the erection of another ore unloading plant as soon as possible. Dock capacity is not now equal to the business that has been assigned to Conneaut. Receipts of ore at that port this month will aggregate about 200,000 tons.

A pile-driving record is reported from Manitowoc, Wis., where Mathews & Keith, contractors of that city, are building a grain elevator for the Northern Grain Co. of Chicago, says "Engineering News." On June 22, pile-driver No. 5 drove 151 piles in ten hours, and pile-driver No. 4 drove 140 piles in the same time. These piles were from 20 to 24 feet long, and they were driven from 18 to 20 feet into the ground to a hardpan stratum. The pile-drivers were specially designed by the above firm and have a 5,000-pound hammer, operated by 30-inch double drums and a 30 horse power engine. Similar drivers were used at Buffalo, N. Y., in putting in the foundations for the Great Northern steel grain elevator.

### Trade Notes.

The Chicago Pneumatic Tool Co. of Chicago has just received an order for six of its tools for Japan—the second order from the Japanese railway. This company has a very large European business, but this Japanese order, coming as it does without solicitation, is especially gratifying.

The Vulcan Iron Works Co. of Toledo is shipping ten steam shovels. Two of these are for use in the phosphate beds near Charleston, S. C.; three are for railroad work, while five will go to Ogdensburg, N. Y., for use on the water power canal from the St. Lawrence river to Grass creek.

Seldom is there issued a more complete catalogue than that recently sent out by the Lunkenheimer Co. of Cincinnati, manufacturers of brass and iron valves, injectors, whistles, lubricators, oil and grease cups and steam specialties. During the past year the firm has made many additions to its plant, including the provision of much new machinery, and is thus enabled to turn out promptly not only the articles described in the catalogue—and it would seem to embrace everything—but special work of a similar character. The catalogue is well worth sending for.



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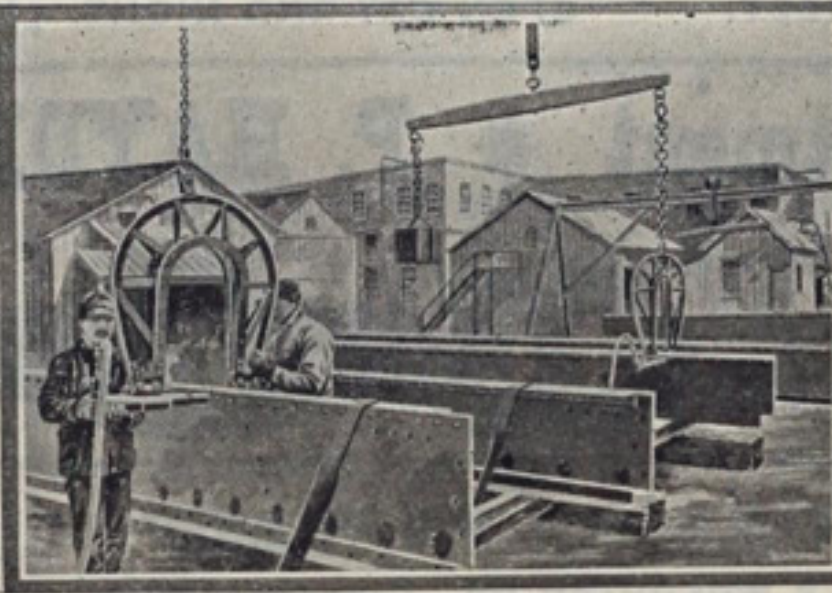
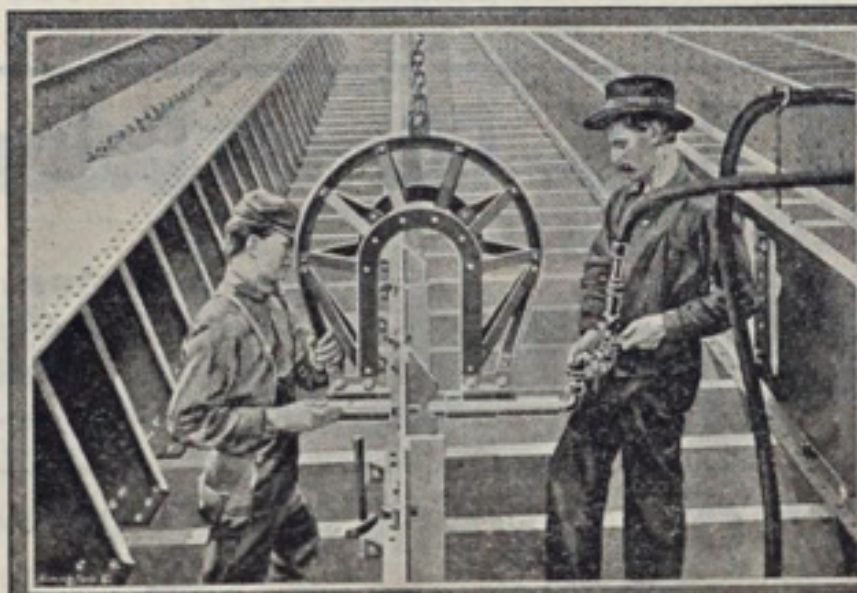
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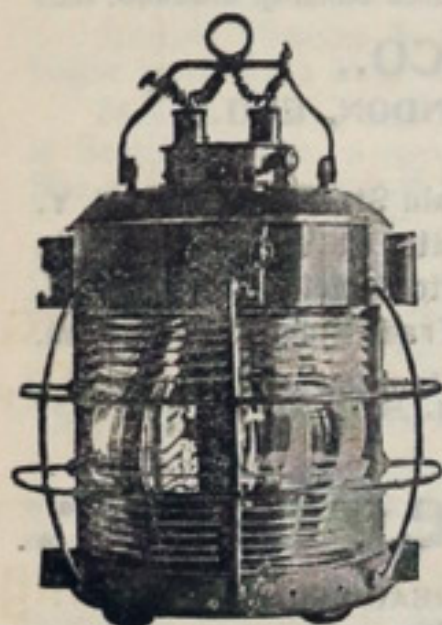
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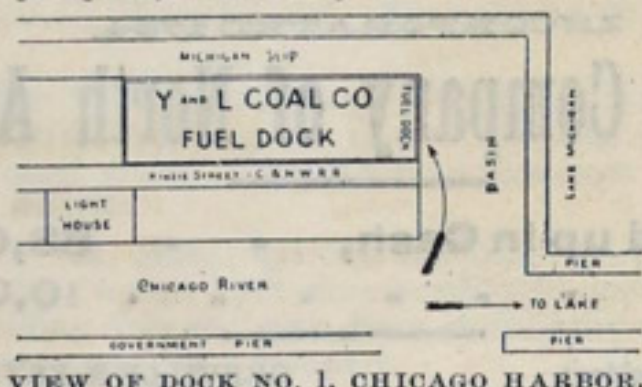
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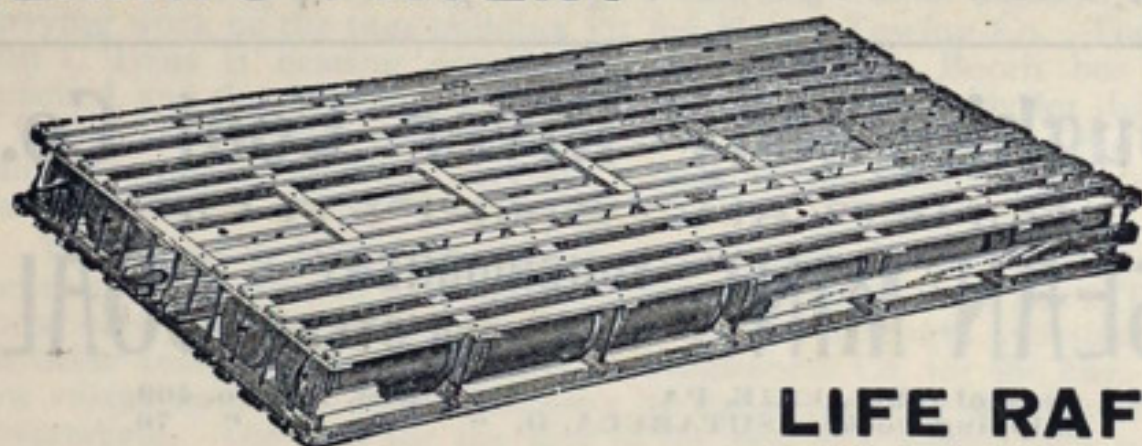
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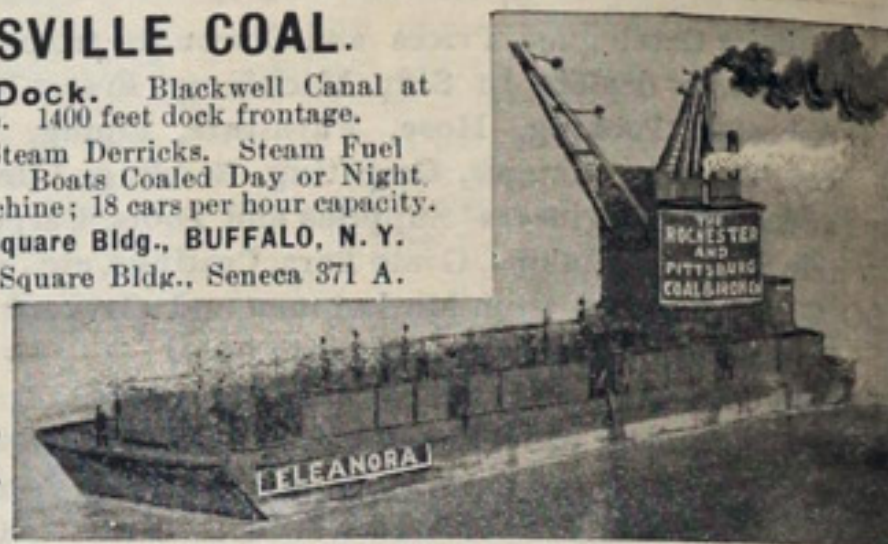
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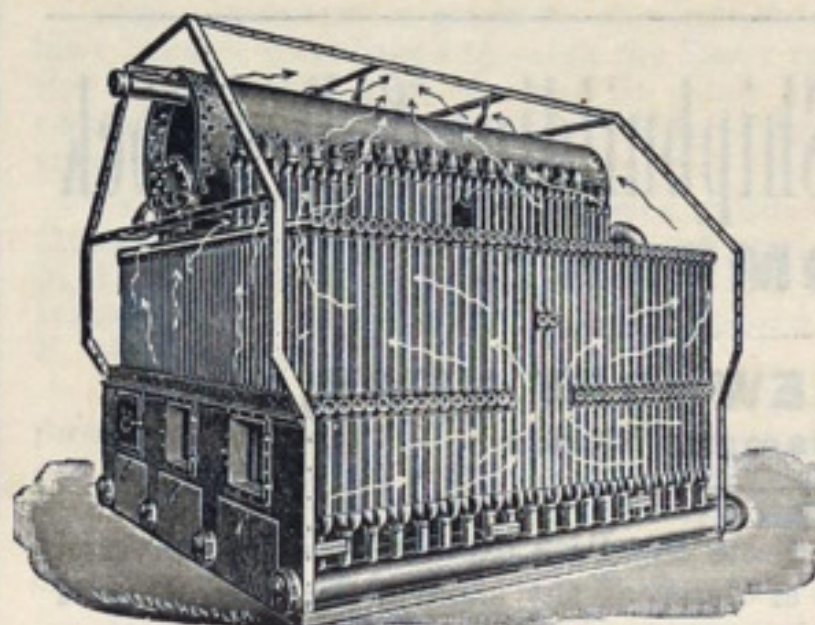
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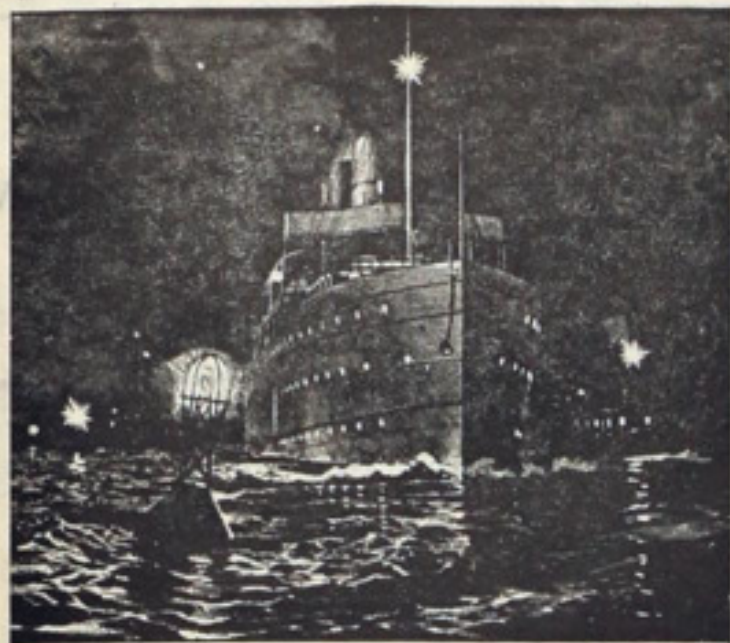
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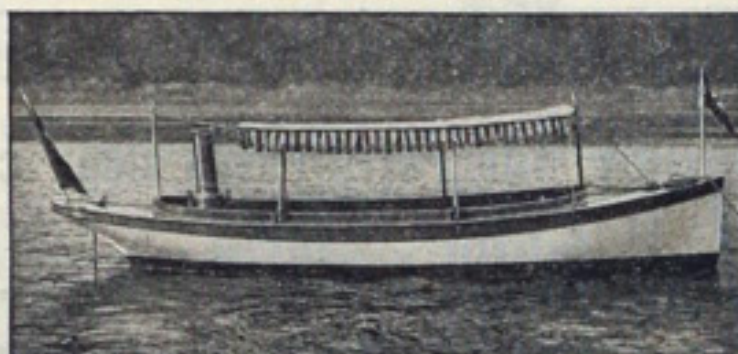
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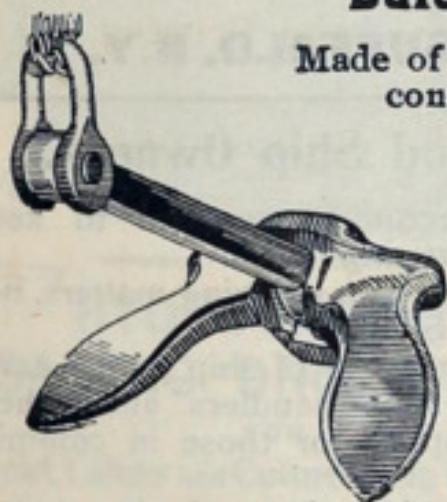
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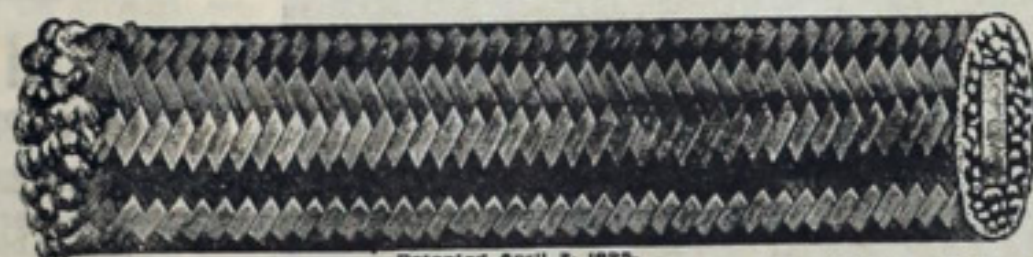
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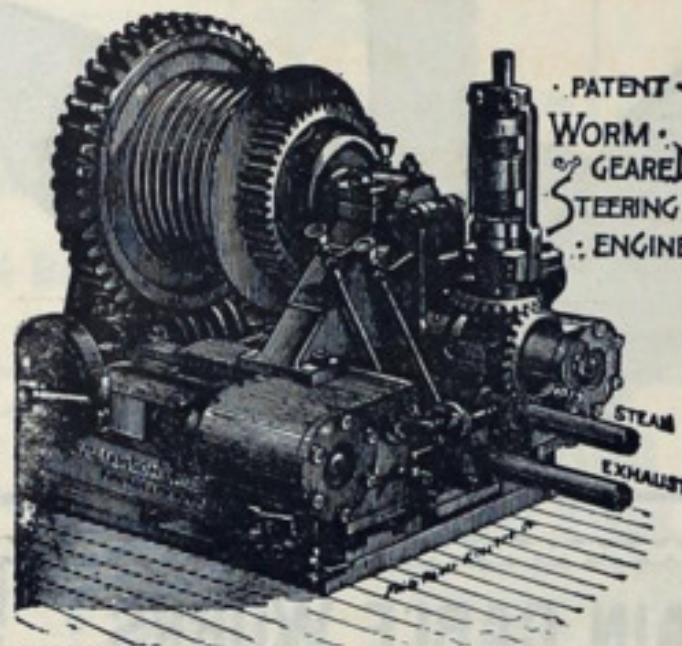


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THE CRESCENT SHIPYARD.

ELIZABETH, N. J., June 25th, 1898

The Marine Review,  
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Cleveland, Ohio.

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I beg to enclose herewith a check for \$5.00 and request that you will send me a copy of the 1898 Blue Book of American Shipping. have seen the book and think that it is a most excellent publication, and one that will be of value to everyone having to do with ships or shipping.

Yours truly,

Dictated.

*San Francisco*

## TO THE PACIFIC.

*Pacific Coast Steamship Company*

*Goodall Perkins & Co. General Agents*

*San Francisco*

22nd June 1898 189

Blue Book of American Shipping,  
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CLEVELAND OHIO.

Gentlemen,-

We have your publication for last year and hence you need not send it as a matter of trial as we know the publication and consider it satisfactory.

Herewith we enclose our check for which please send us the Blue Book for 1898.

Yours truly,

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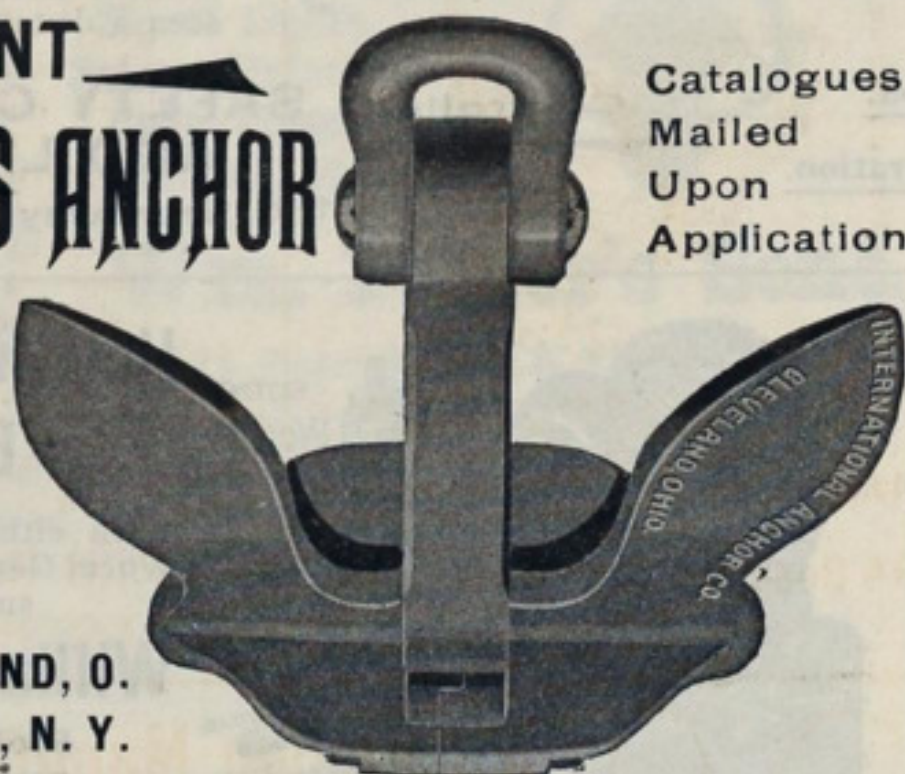
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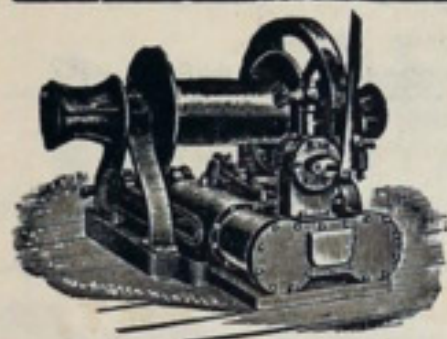
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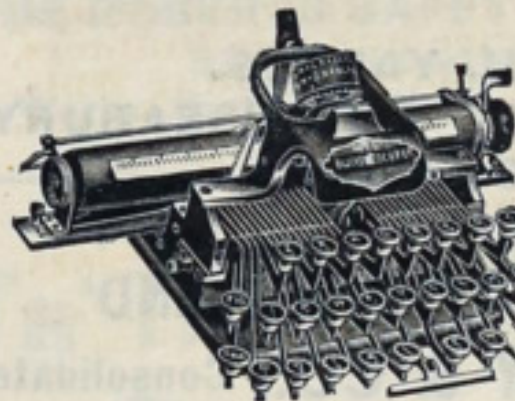
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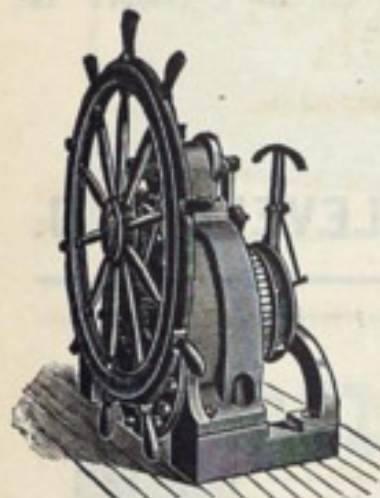
Lth. over all, 380 ft.  
Lth. on blocks, 340 ft.  
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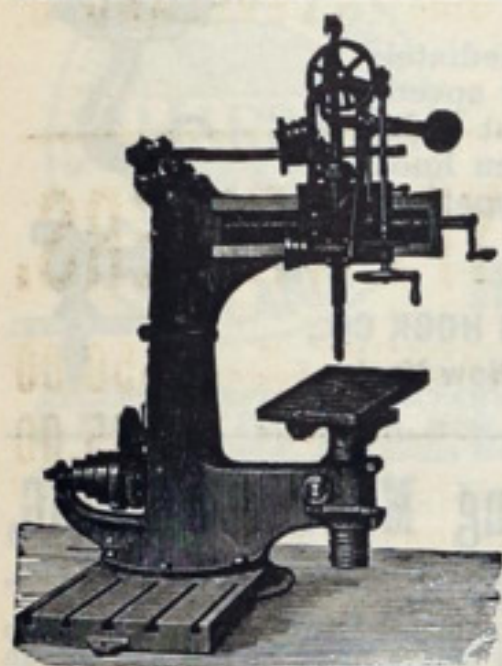
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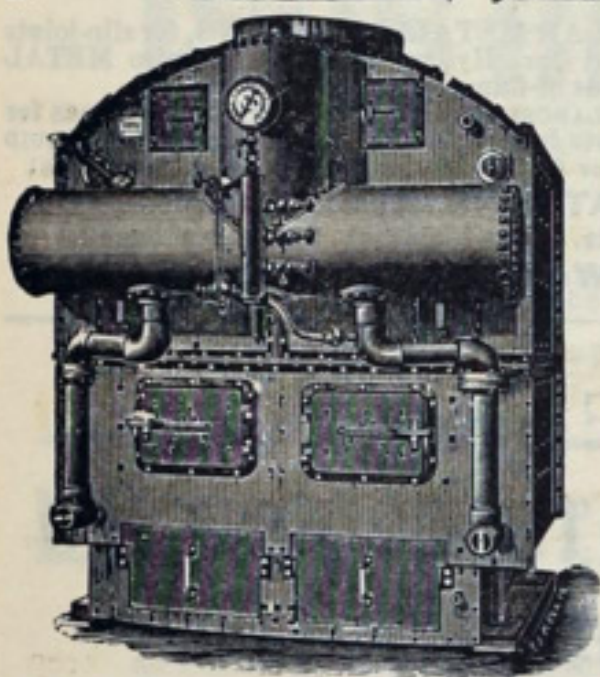
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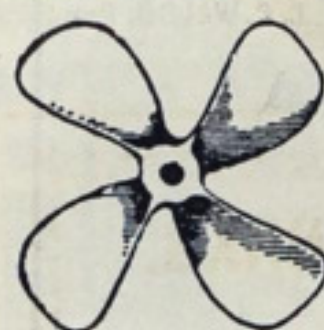
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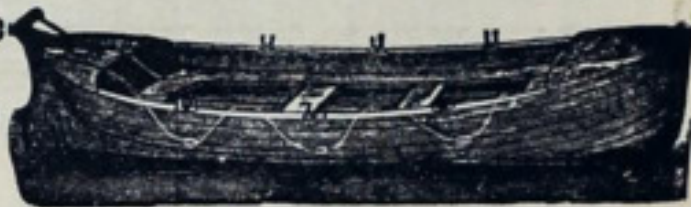
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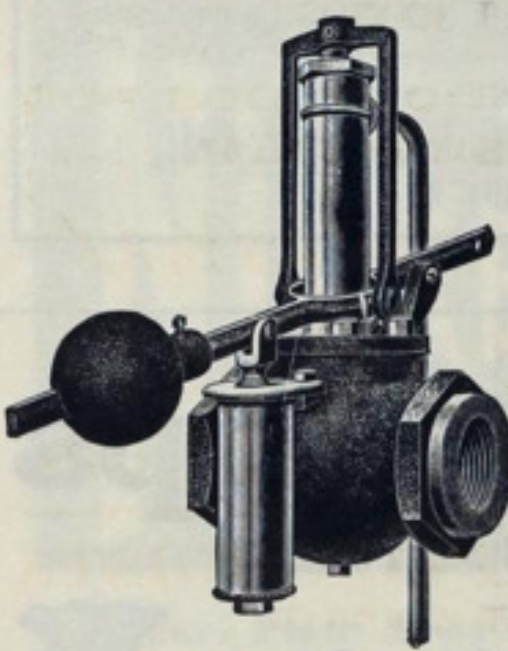
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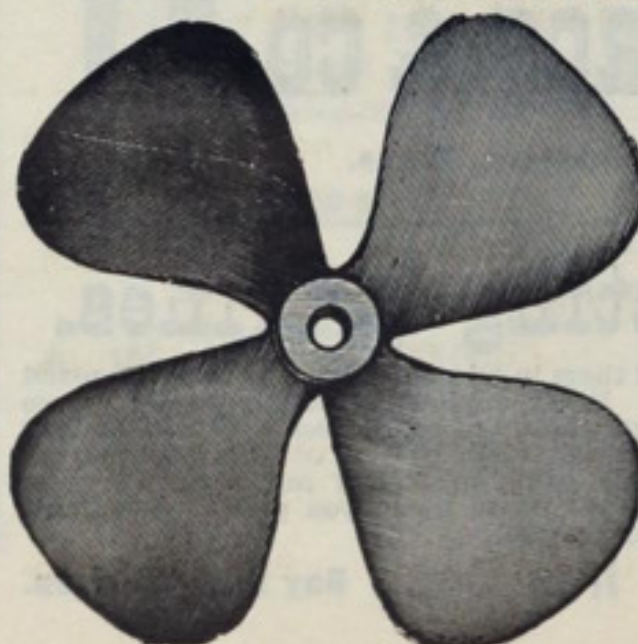
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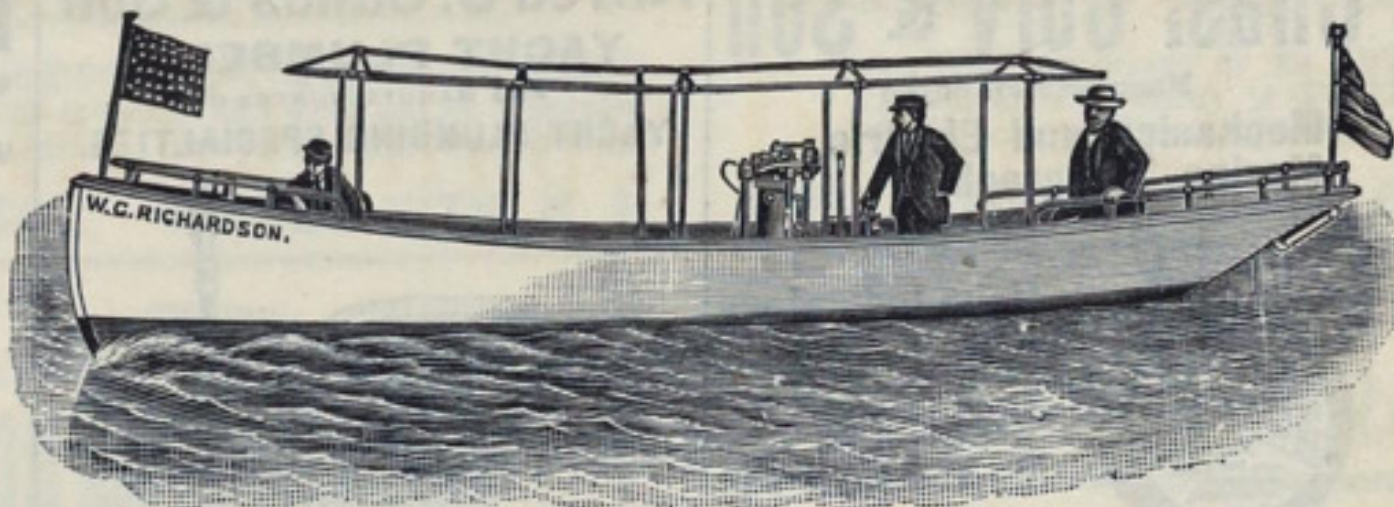


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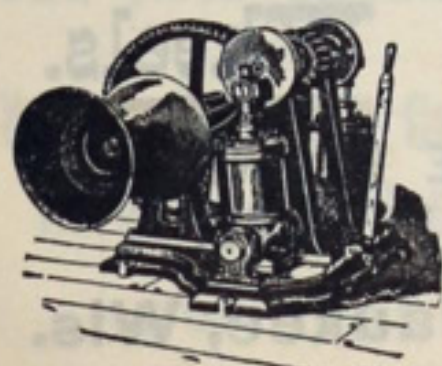
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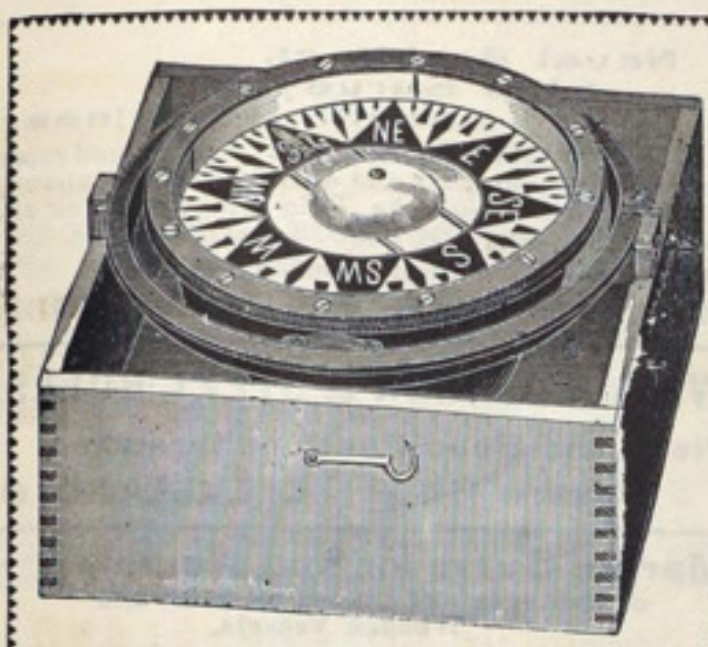
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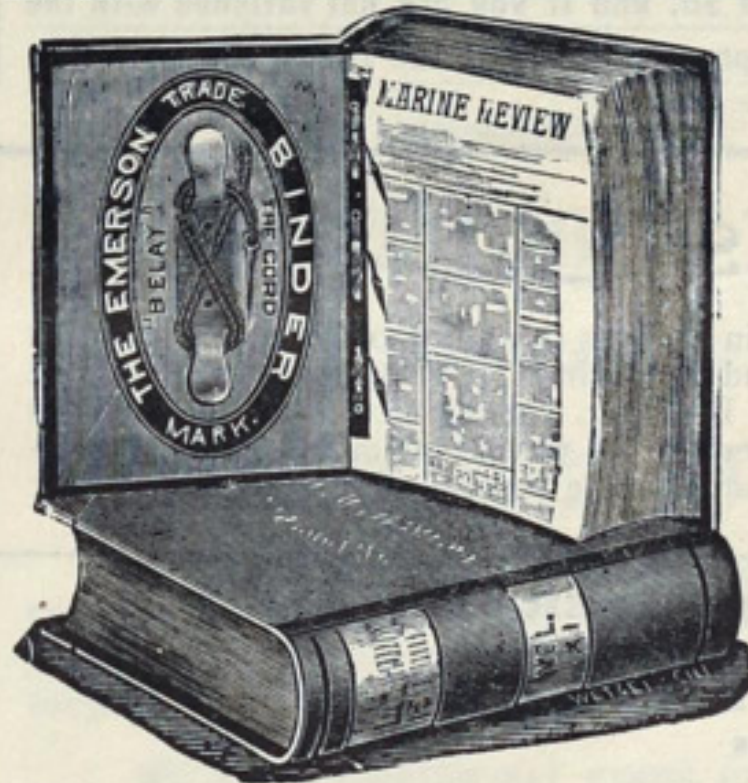
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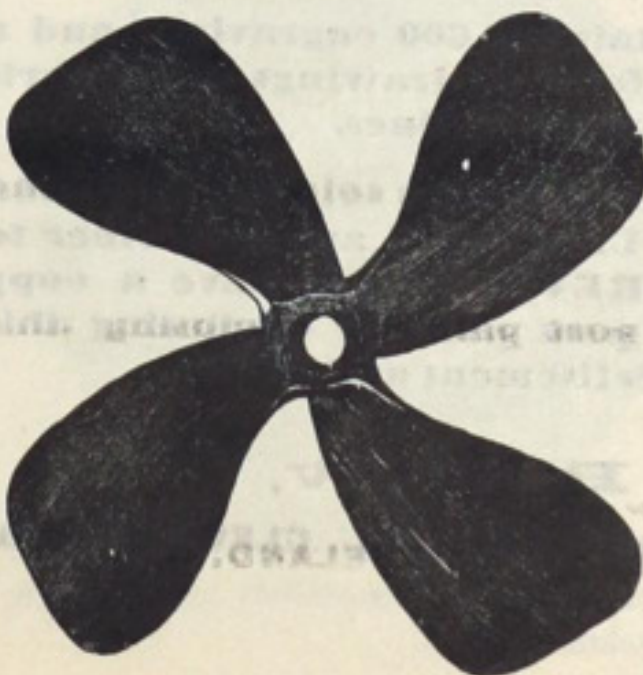
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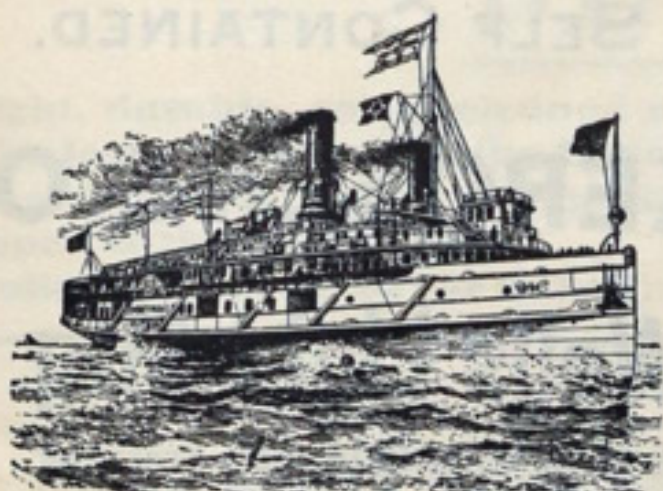
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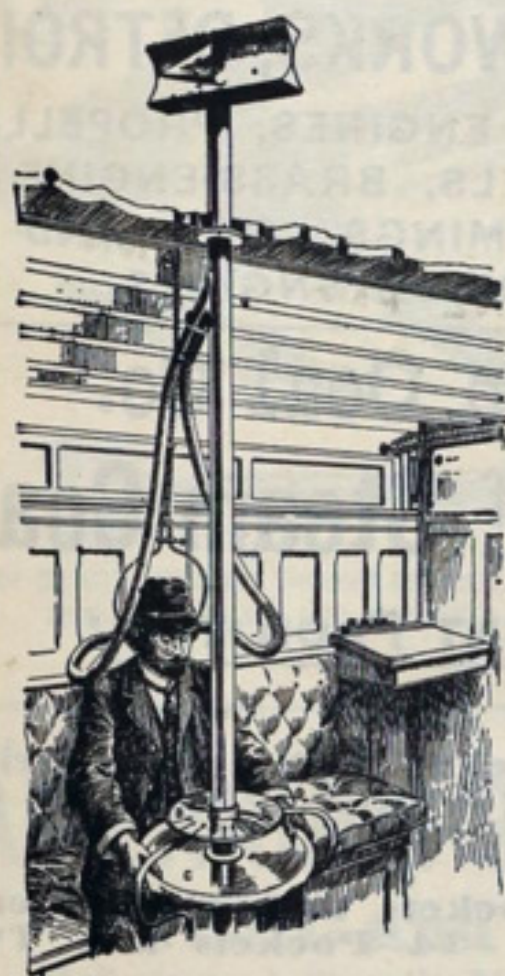
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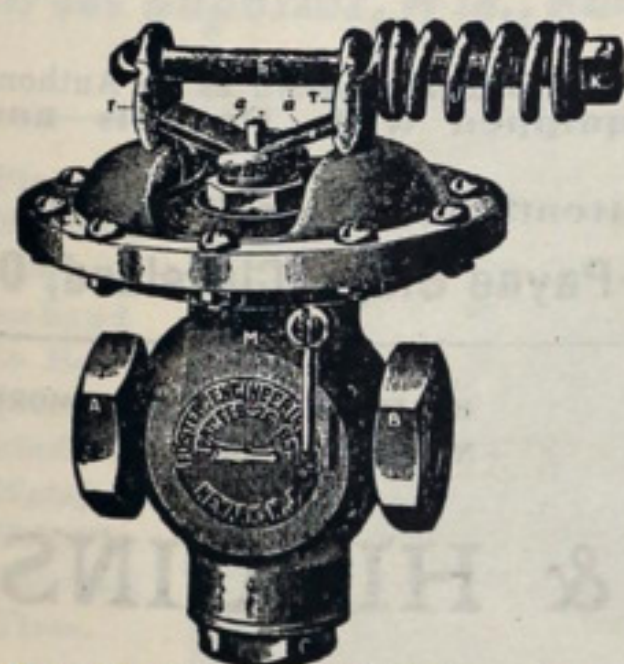
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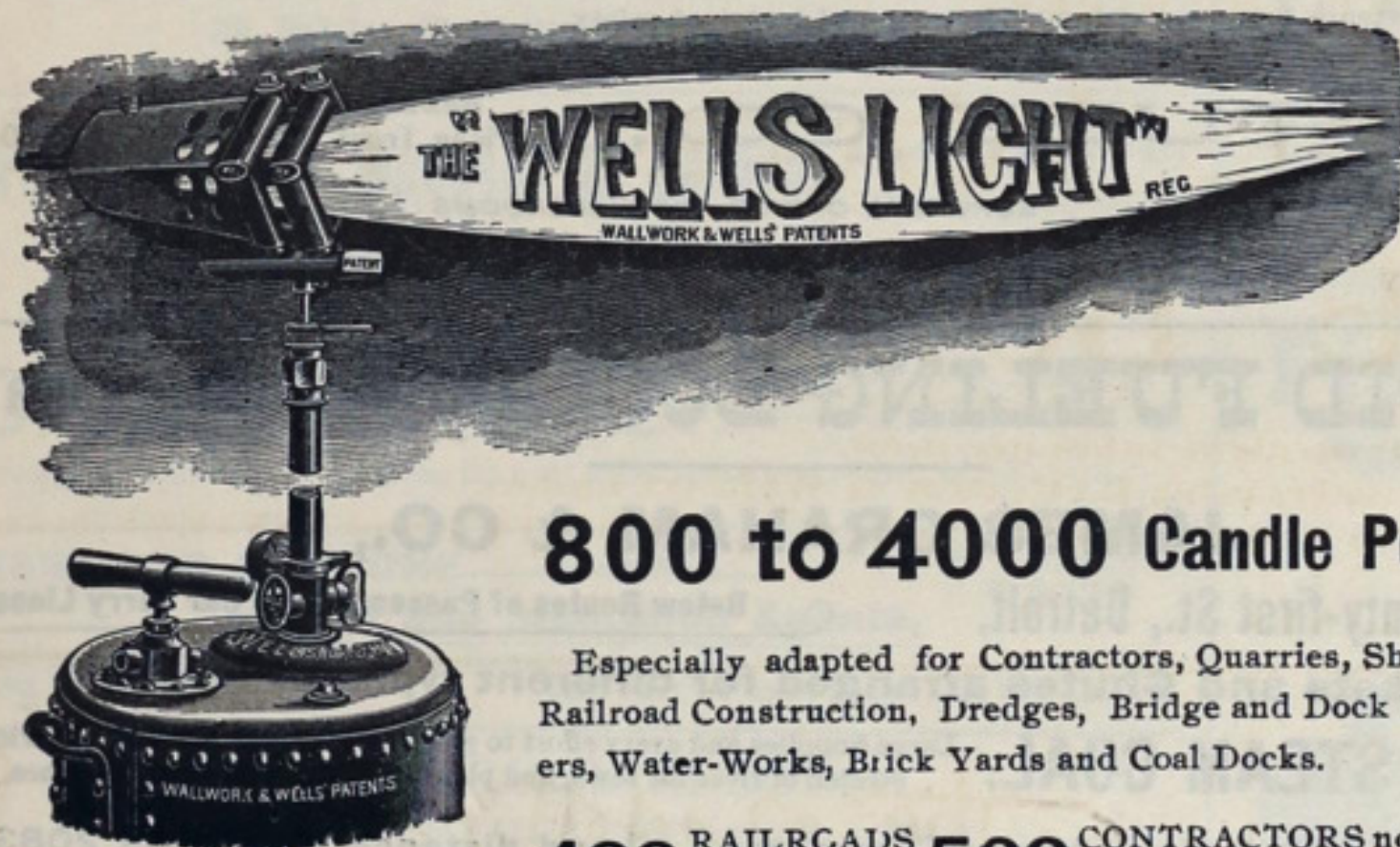
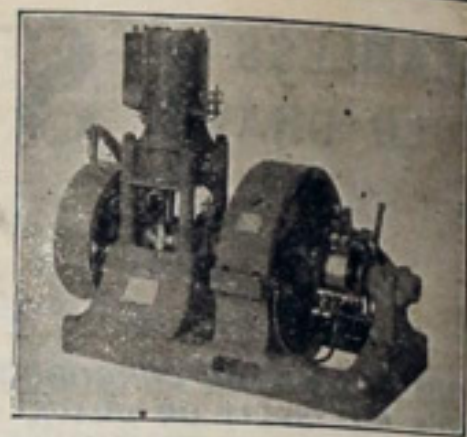
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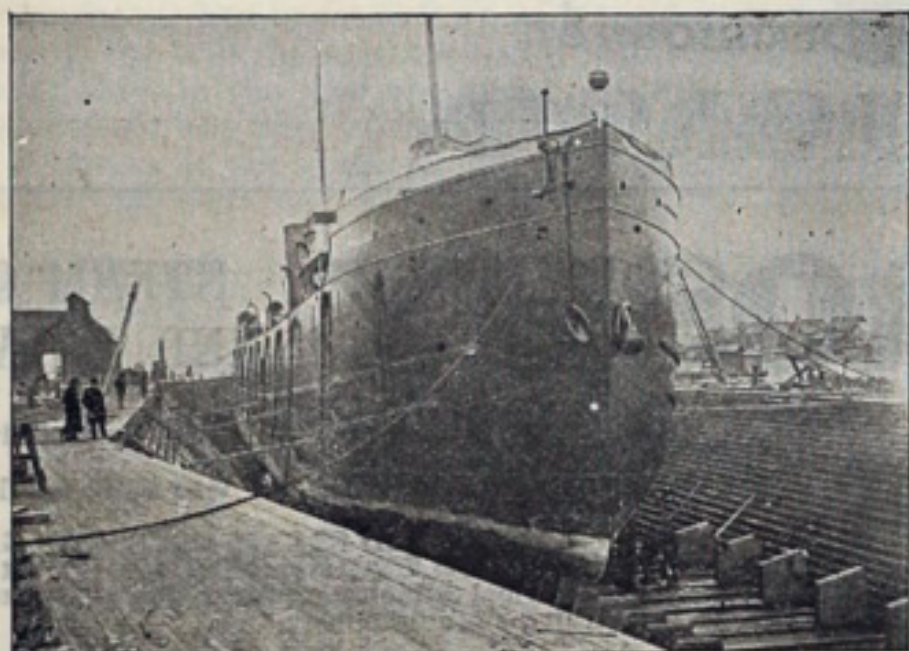


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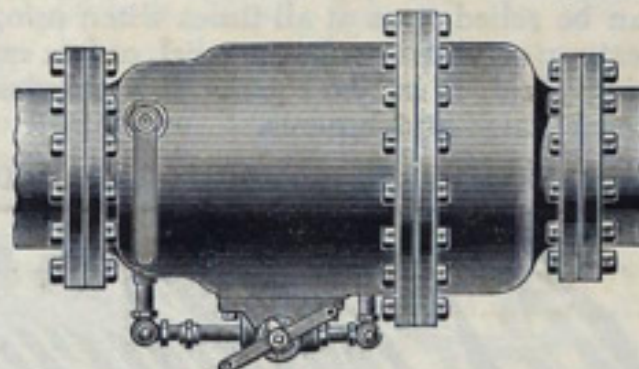
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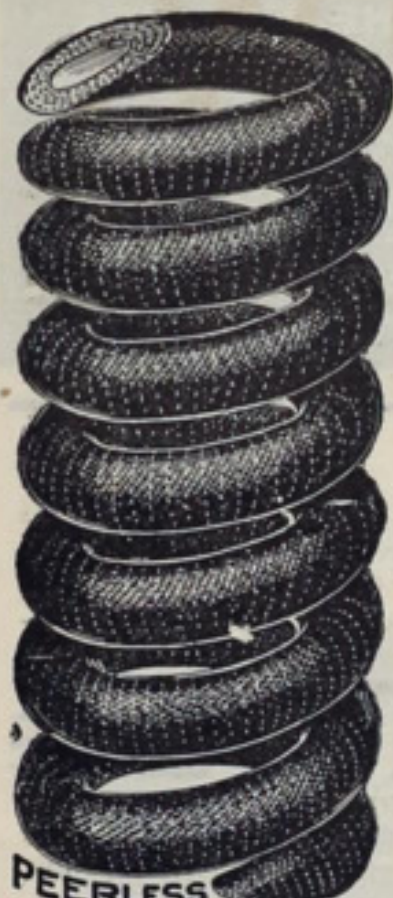
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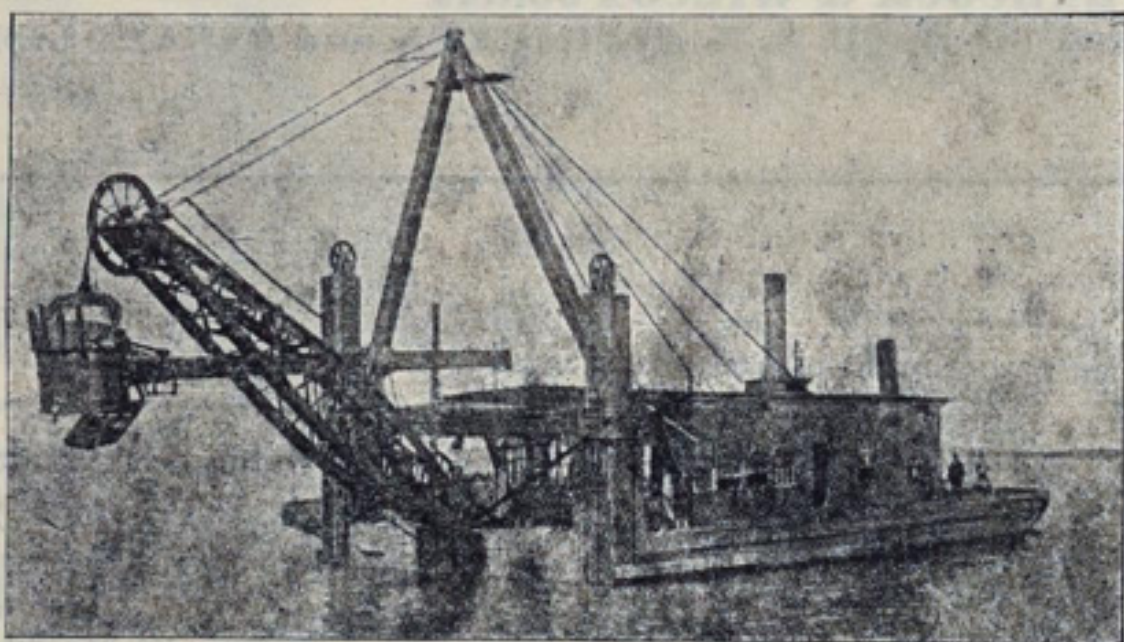
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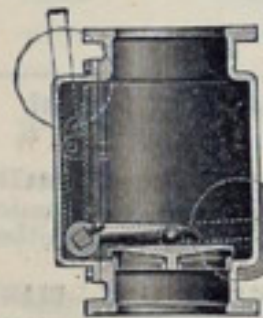
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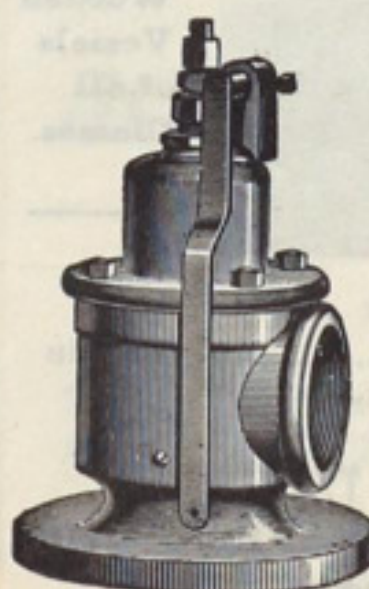
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